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MicroBNOISE: A User's Manual

by
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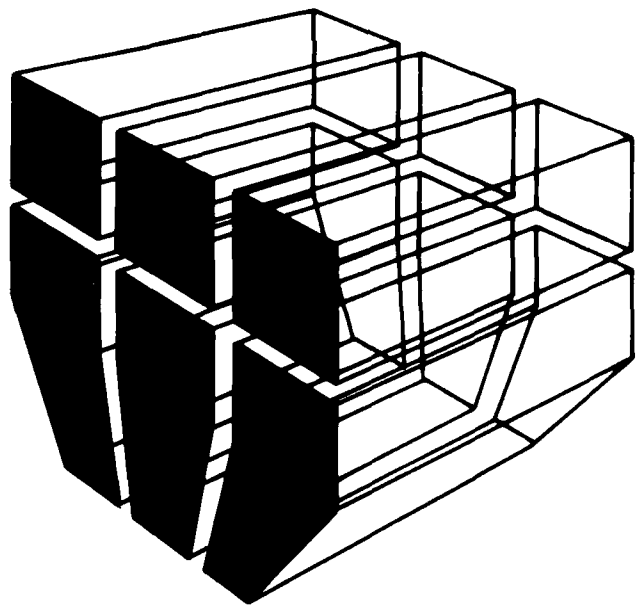

This report provides instruction for using Micro-BNOISE—a computer program that supports the Army's Installation Compatible Use Zone Program (ICUZ) by enabling installation personnel to examine the relative consequences of blast-related mission activities. Installation planners and managers can use this program to assess results of realigning and re-scheduling mission activities.

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Note Concerning Addenda to USA-CERL TR N-86/12, *MicroBNOISE: A User's Manual*

During extensive use of MicroBNOISE and while training personnel in the use of the software, it was discovered that the manual could be expanded in several places to improve clarity. It was also discovered that a few hints could make use of the software much easier, particularly for the relatively inexperienced user. These expansions and hints will be published in the form of addenda.

Each addendum will consist of pages to be inserted into TR N-86 at the places indicated; e.g., pages 15.1 and 15.2 should follow page 15 of N-86/12. Addendum #1 has already been produced and inserted in this manual.

It is expected that further addenda will be produced as more experience with MicroBNOISE is gained, and as the data bases are expanded. Users are encouraged to send suggestions for improvements to the USA-CERL Principal Investigators.

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This report provides instruction for using MicroBNOISE--a computer program that supports the Army's Installation Compatible Use Zone Program (ICUZ) by enabling installation personnel to examine the relative consequences of blast-related mission activities. Installation planners and managers can use this program to assess results of realigning and rescheduling mission activities.

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FOREWORD

This project was performed for Headquarters, U. S. Army Forces Command (FORSCOM), Fort McPherson, GA, under Intra-Army Order Number 35-86, dated 9 April 1985. Mr. Patrick Kelly, Master Planning Office (AFEN-RMP), and Mr. Rudy Stine, Environmental Office, AFEN-FDE, were the FORSCOM project monitors.

The work was performed by the Environmental Division (EN), U. S. Army Construction Engineering Research Laboratory (USA-CERL). The System Analysis Department, Analysis & Technology, Inc., North Stonington, CT, adapted the mainframe version of BNOISE to microcomputers and provided the documentation under Contract DACA88-84-0019. Mr. Richard G. Gauthier was the Project Manager.

Dr. Steven Hottman and Mr. John Fittipaldi were the USA-CERL Principal Investigators. Administrative support and counsel were provided by Mr. Walter Mikucki, Mr. Ronald Webster, Mr. Robert Riggins, and Dr. Paul Schomer, all of USA-CERL. Mr. Robert Riggins is Acting Chief of USA-CERL-EN.

COL Paul J. Theuer is Commander and Director of USA-CERL, and Dr. L. R. Shaffer is Technical Director.

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1 INTRODUCTION

Background

The Army has developed the Installation Compatible Use Zone (ICUZ) program to safeguard the operational capability of Army installations from encroachment by off-post, noise-sensitive land uses such as housing. ICUZ, which is based on the Integrated Noise Contour System[1] developed by the U.S. Army Construction Engineering Research Laboratory (USA-CERL), requires noise contours to be developed around military installations to assist in effective land-use planning and to prevent community encroachment on high-noise training areas. By identifying heavily noise-impacted areas, the public, local governments, and the installation can work together to minimize noise-sensitive development. The ICUZ program uses the Blast Noise Prediction (BNOISE 3.2) computer program[2] to generate noise contour maps that characterize an installation's noise "footprint."

BNOISE was developed by USA-CERL and is operated by the U.S. Army Environmental Hygiene Agency for all requesting Army installations. Recent research has made BNOISE operable from its current operating environment (a CDC mainframe computer) on any one of a family of microcomputers. The microcomputer system has been successfully operated on an IBM-AT, AT&T Model 6300, and a COMPAC DESKPRO Model IV. USA-CERL Technical Report E-17[3] provides details of the modeling organization and computational algorithms.

MicroBNOISE, as the program is now called, can be run on any IBM-compatible microcomputer that has 400 Kbytes of Random Access Memory (RAM), a mathematics coprocessor, and a fixed disk. As currently implemented, the microcomputer must also be connected to a Hewlett-Packard (HP) compatible plotter to produce noise plots. (The 7470A and the 7475A have been used successfully.) Installation planners can use the plots to assess the results of realigning and rescheduling mission activities.

Purpose

The purpose of this report is to provide instructions for using MicroBNOISE.

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[1] Lincoln L. Little, Violet I. Pawlowska, and David L. Effland, *Blast Noise Prediction Volume II: BNOISE 3.2 Computer Program Description and Program Listing*, Technical Report N-98/ADA099335 (U. S. Army Construction Engineering Research Laboratory [USA-CERL], 1981); Paul D. Schomer, et al., *Blast Noise Prediction Volume I: Data Bases and Computational Procedures*, Technical Report N-98/ADA099440 (USA-CERL, 1981).

[2] USA-CERL Technical Report N-98, Vols I and II.

[3] Paul D. Schomer, *Predicting Community Response to Blast Noise*, Technical Report E-17/ADA773690 (USA-CERL, 1973).

Approach

The table generation capabilities, program inputs, module functions, and contouring display program are described (Chapter 2), and a detailed example of a user session provided (Chapter 3).

Scope

The information in this report assumes that the user already has a fundamental knowledge of how to operate an IBM-compatible microcomputer system. Appendix E provides a short summary of the disk operating commands needed to install and run MicroBNOISE.

Mode of Technology Transfer

The program and documentation for MicroBNOISE are available from the Army Environmental Hygiene Agency.

2 DESCRIPTION AND USE OF MICROBNOISE

MicroBNOISE is a series of digital computer programs that can produce C-weighted day/night average sound level (CDNL) contours for military activities or operations having impulsive noise sources (e. g., artillery, explosions or demolitions, and weapon blasts). These programs are written in FORTRAN 77 and used on IBM-compatible microcomputers. They include TABGEN (a table generation program), EDITOR (a user-friendly, conversational data input program), LCDN (a contour generation program), and NASAPLOT (a general-purpose contouring display program). Figure 1 shows the relationship between these programs and their sequence of use.

The software is operational on microcomputers running under the Microsoft Disk Operating System (MS-DOS). MicroBNOISE is a conversational, user-friendly system capable of accepting various operational scenarios and installations defined by the system user.

Using MicroBNOISE on a microcomputer is quite simple. Once the programs and data files have been loaded onto the fixed disk (see Appendix E), the user simply types the word BNOISE to begin executing the MicroBNOISE system. Appendix A lists the files needed to run the system. All input is made in response to prompts from the computer. The user's responses are checked for accuracy, and the user is reprompted for data whenever a response is invalid or unreasonable. The system automatically channels the flow from one program to another; this process is transparent to the user.

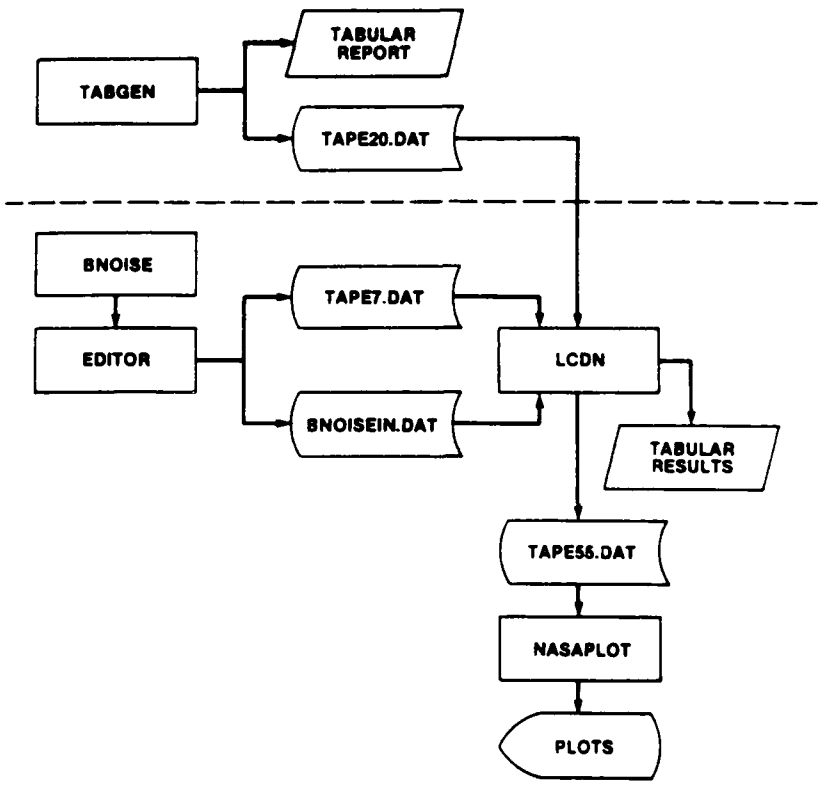

Figure 1. MicroBNOISE system flow.

TABGEN Program

TABGEN creates the tables of decibel (dB) values produced at given distances by a 5-lb C-4 explosive charge. The LCDN program then uses these tables to calculate CDNL. The tables are automatically stored in disk file TAPE20.DAT (Appendix B). TABGEN needs to be run only once to produce the disk file. (TAPE20.DAT has already been initialized from an input file called TABGENIN.DAT; no operator action is required.)

EDITOR Program

This program is a preprocessor to the LCDN program. Its sole purpose is to accept data from the user in an interactive, user-friendly manner and create the following two input files for LCDN:

1. TAPE7.DAT, the database file, which contains gun-type, target-point, and firing-point data (discussed below).

2. BNOISEIN.DAT, which contains the module data that direct the calculation flow of LCDN and produce printed and/or plotted results. The module data are discussed on p 18.

Responses to EDITOR prompts must be input in upper-case letters.

Gun-Type Data

The gun-type data describe the weapons by specifying the weight of explosive in the projectile, the weight of the different propellant charges, the name of the weapon, the weight parameters A and B,* and the directivity pattern (variation of the noise pattern emanating from the source). The user must differentiate between the amount of propelling charge at the firing point and the amount of projectile charge exploding at the target point. These values vary for different weapons and ammunition. Table 1 gives the codes used for a set of standard weapons; as new weapons are measured and the data analyzed, this set of weapons will be expanded. USA-CERL will provide revisions periodically. Tables 2 and 3 give the weight of propellant and projectile charges for these weapons (in TNT equivalents) and directivity information.

Table 2 shows that various amounts of propellant can be used to fire one size of projectile. The user is not restricted to the weapon types listed in Tables 1, 2, and 3. He** may create data to suit his needs as long as they are entered and labeled with a new gun-type code. All of the data in Tables 1, 2, and 3 are already stored in a disk file within MicroBNOISE called GUNTABLE.DAT. The user may either select weapons individually, select all of the weapons, or enter a new weapon code. The user responds to the following prompts:

SELECT WEAPON CODES (0 TO END, 99 FOR ALL)

WEAPON CODE: _ _ _ _ _ _

*Chapter 5 of USA-CERL Technical Report N-98 defines these parameters.
**The male pronoun is used to refer to both sexes.

Table 1

Weapon Codes

Weapon	Code
105-mm howitzer (M102)	1
155-mm howitzer (M109)	2
8-in. howitzer (M110)	3
175-mm gun	4
155-mm howitzer (M109A1)	5
155-mm howitzer (M114)	6
8-in. howitzer (M110A1)	7
155-mm howitzer (M198)	8
8-in. howitzer (M110A2)	9
Small-charge TNT (0.25-90 lb)	10
Large-charge TNT (110-500 lb)	11
60-mm mortar	20
81-mm mortar	22
107-mm mortar (4.2 in.)	23
57-mm recoilless rifle	30
90-mm recoilless rifle (M67)	31
106-mm recoilless rifle (M40A1)	32
20-mm gun	40
40-mm gun	41
57-mm gun	42
90-mm gun	43
2.75-in. rocket	50
3.5-in. rocket	51
66-mm rocket	52
LAW missile (M72)	53
TOW missile	54
Dragon missile	55
Shillelagh missile (from 152-mm gun)	56
40-mm grenade launcher (M203)	60
Rifle grenade (M79)	61
Hand grenade (M67)	62
M60 tank (105-mm) regular shell	90
M60 tank (105-mm) high-velocity shell	91
152-mm tank gun (Sheridan) (M551) regular shell	92
152-mm tank gun (Sheridan) (M551) HEAT-T shell	93
165-mm cannon (M135)	94
120-mm Abrams HEAT shell	95
120-mm Abrams SABO	96

Table 2

Projectile and Propellant Weights for Table 1 Weapon Codes (TNT Equivalent in Pounds)

Weapon Code	Projectile Weight	Propellant Weight Charge Zones									
		1	2	3	4	5	6	7	8	9	10
1	4.6	0.5175	0.6050	0.7731	1.0040	1.3275	1.8656	2.7456			
2	15.4	1.7687	2.2875	3.0875	4.0250	7.0500	9.8375	13.2750	20.34		
3	36.3	5.3188	6.2688	7.5125	9.5188	16.8500	22.0125	28.1375	38.00	43.6	
4	31.3	23.5600	39.7000	57.2400							
5	15.4	1.7687	2.2875	3.0875	4.0250	7.05	9.8375	13.2750			
6	15.4	1.7687	2.2875	3.0875	4.0250	7.05	9.8375	13.2750	20.34		
7	36.3	5.3188	6.2688	7.5125	9.5188	16.85	22.0125	28.1375	38.00	43.6	
8	15.4	1.7687	2.2875	3.0875	4.0250	7.05	9.8375	13.2750	20.34		
9	36.3	5.3188	6.2688	7.5125	9.5188	16.85	22.0125	28.1375	38.00	43.6	
10		0.2500	1.0000	5.0000	10.0000	15.00	25.0000	35.0000	50.00	70.0	90.0
11		110.0000	140.0000	170.0000	200.0000	240.00	290.0000	340.0000	390.00	440.0	500.0
20	0.42	0.0210	0.0420	0.0630	0.0840						
22	2.25	0.0420	0.0653	0.0886	0.1119	0.1352	0.1585	0.1818	0.1941	0.2284	
23	8.50	0.0803	0.1132	0.1642	0.3369	0.6717					
30	0.55	1.0									
31	1.72	1.31									
32	2.79	8.0									
40	0.05	0.200									
41	0.14	0.718									
42	0.44	2.280									
43	1.90	7.310									
50	5.00	0.01									
51	1.88	0.01									
52	0.13	0.85									
53	0.66	0.01									
54	5.30	0.01									
55	3.50	0.01									
56	8.00	14.00									
60	0.60	0.0100									
61	0.60	0.0001									
62	0.60	0.0100									
90	6.60	5.90									
91	2.14	11.50									
92	9.50	6.00									
93	6.30	6.00									
94	20.00	2.12									
95	0.10	0.10									
96	0.10	0.10									

Table 3

Directivity Information for Table 1 Weapon Codes

Weapon Code	A	B	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	Avg.
1	83.78	13.91	17.80	13.91	10.02	6.46	2.97	0.53	0.0	0.53	2.97	6.46	10.02	13.91	10.84
2	75.74	18.51	0.63	0.46	0.29	1.00	1.45	0.39	0.0	0.39	1.45	1.00	0.29	0.46	0.67
3	83.64	14.13	13.77	10.29	6.82	4.01	1.42	-0.64	0.0	-0.64	1.42	4.01	6.82	10.29	7.36
4	73.29	17.50	16.33	13.08	9.84	5.41	3.03	0.50	0.0	0.50	3.03	5.41	9.84	13.08	9.90
5	72.08	18.11	-1.88	-1.71	-1.53	-0.49	0.94	-0.52	0.0	-0.52	0.94	-0.49	-1.53	-1.71	-0.60
6	80.86	15.59	14.93	12.55	10.18	6.87	3.20	1.56	0.0	1.56	3.20	6.87	10.18	12.55	9.45
7	76.99	15.87	16.33	13.08	9.84	5.41	3.03	0.50	0.0	0.50	3.03	5.41	9.84	13.08	9.90
8	72.08	18.11	-1.88	-1.71	-1.53	-0.49	0.94	-0.52	0.0	-0.52	0.94	-0.49	-1.53	-1.71	-0.60
9	73.29	17.50													
10															
11															
20	95.00	20.00	8.29	6.39	4.48	5.75	2.20	2.88	0.0	2.88	2.20	5.75	4.48	6.39	4.86
22	90.27	19.57	8.29	6.39	4.48	5.75	2.20	2.88	0.0	2.88	2.20	5.75	4.48	6.39	4.86
23	85.17	18.85	8.45	6.61	4.78	5.17	1.89	1.58	0.0	1.58	1.89	5.17	4.78	6.61	4.74
30	106.00	0.0	2.28	-0.87	-4.02	-4.77	-2.40	-0.07	0.0	-0.07	-2.40	-4.77	-4.02	-0.87	-1.29
31	107.10	0.0	-9.51	-9.75	-9.98	-7.18	-3.17	-0.49	0.0	-0.49	-3.17	-7.18	-9.98	-9.75	-4.11
32	117.80	0.0	2.28	-0.87	-4.02	-4.77	-2.40	-0.07	0.0	-0.07	-2.40	-4.77	-4.02	-0.87	-1.29
40	90.00	15.00	13.77	10.29	6.82	4.01	1.42	-0.64	0.0	-0.64	1.42	4.01	6.82	10.29	7.36
41	85.00	15.00	13.77	10.29	6.82	4.01	1.42	-0.64	0.0	-0.64	1.42	4.01	6.82	10.29	7.36
42	85.00	15.00	13.77	10.29	6.82	4.01	1.42	-0.64	0.0	-0.64	1.42	4.01	6.82	10.29	7.36
43	85.00	15.00	13.77	10.29	6.82	4.01	1.42	-0.64	0.0	-0.64	1.42	4.01	6.82	10.29	7.36
50	88.75	13.85													
51	88.75	13.85													
52	88.75	13.85													
53	106.80	0.00	-18.5	-17.1	-16.0	-8.00	-5.40	-1.90	0.0	-1.90	-5.40	-8.00	-16.0	-17.1	-5.60
54	106.10	0.00	-22.0	-19.7	-18.2	-6.40	-3.50	-1.40	0.0	-1.40	-3.50	-6.40	-18.2	-19.7	-4.90
55	88.75	13.85													
56	88.75	13.85													
60	85.00	0.00													
61	65.00	0.00													
62	65.00	0.00													
90	111.40	0.00	15.35	14.04	12.73	7.61	4.81	1.09	0.0	1.09	4.81	7.61	12.73	14.04	10.78
91	115.80	0.00	15.35	14.04	12.73	7.61	4.81	1.09	0.0	1.09	4.81	7.61	12.73	14.04	10.78
92	115.80	0.00	7.56	7.38	7.19	2.73	1.05	-0.39	0.0	-0.39	1.05	2.73	7.19	7.38	4.80
93	115.80	0.00	7.56	7.38	7.19	2.73	1.05	-0.39	0.0	-0.39	1.05	2.73	7.19	7.38	4.80
94	60.91	14.49	13.77	10.29	6.82	4.01	1.42	-0.64	0.0	-0.64	1.42	4.01	6.82	10.29	7.36
95	117.40	0.00	7.20	6.50	5.60	4.30	2.80	1.40	0.0	1.40	2.80	4.30	5.60	6.50	4.60
96	118.60	0.00	5.40	5.30	5.20	3.70	1.30	0.70	0.0	0.70	1.30	3.70	5.20	5.30	3.60

If the user selects a weapon code that does not appear in Table 1, he can correct the mistake or enter a new weapon code. The following prompts will be issued for entering a new weapon code:

DO YOU WANT TO INPUT DATA FOR THIS CODE? _____

PROJECTILE WEIGHT: _____

PROPELLANT WEIGHT FOR CHARGE ZONE 1: _____

.

.

.

PROPELLANT WEIGHT FOR CHARGE ZONE 10: _____

NAME OF WEAPON: _____

PARAMETER A: _____

PARAMETER B: _____

DECIBEL DIFFERENCE AT 0 DEGREES: _____

DECIBEL DIFFERENCE AT 30 DEGREES: _____

.

.

.

DECIBEL DIFFERENCE AT 150 DEGREES: _____

AVERAGE DECIBEL DIFFERENCE: _____

The weapon code must be a one- or two-digit number. The projectile and propellant weights are expressed in equivalent pounds of TNT explosive (see Table 2). The name of the weapon is limited to the first 20 characters that the user inputs. The dB difference for the weapon is the difference between the level measured at the rear of the gun (i. e., at 180 degrees) and the level measured at some other position (e. g., at 150 degrees); 0 degree is the front of the gun. Table 3 shows these values. The parameters A, B, and AVG are used to calculate the difference between the blast from the weapon and the standard blast produced by a 5-lb C-4 explosive charge. For a weapon not listed in Table 1, use the values for the weapon that most closely resembles the new (unlisted) weapon (e. g., tube length and diameter, breech-type, charge weight, etc.).

Target Point Data

MicroBNOISE considers noise from firing points and target points. The firing point is the spot from which a projectile is being launched or the site of a demolition charge; the target point is the site of a projectile's impact. If data are to be useful to

MicroBNOISE, a projectile's launching weapon must produce a sharp blast and not a drawnout, "whoosh-type" sound such as that emitted by most rockets. (At present, a small charge is used to simulate the sound of rockets.)

Target point data that must be input include the x and y coordinates (i.e., installation grid map coordinates) of the target point and the ground correction factor* (in dB). The default value for the ground correction factor is 1.5 dB. To use the default values in any of the data in MicroBNOISE, the user need only enter a zero. There is a limit of 50 targets.

The first prompt for target point data is:

DO YOU WANT TO INPUT FROM A FILE? ____

The user responds either "Y" for yes or "N" for no. The program can recover information from a disk file. A user who responds "Y" will have saved a file of target data in a previous session. Regardless of the response (Y or N), the user is next given the following options:

ADD, DELETE, LIST, SAVE, OR END? ____

The valid responses of A, D, L, S, and E** are as follows. ADD allows the user to add a single target point to the in-memory list of target points. DELETE allows the user to delete a single target point from the in-memory list. This target point could have been input either from a file or from the keyboard. ADD and DELETE both generate the prompt:

TARGET ID: ____

where the target ID is a one- to three-character name (e. g., TP1 or T33). Option ADD also requests the following:

LOCATION, X-COORDINATE: ____

LOCATION, Y-COORDINATE: ____

GROUND CORRECTION FACTOR (dB) [1.5]: ____

Note that default values, where used, are always found within brackets, [ ]. Executing LIST and END does not require any more input. LIST will display all the target points currently in memory (RAM) on the user's monitor. END will channel the user to the firing point input section of the EDITOR. SAVE allows all the targets currently in-memory to be saved in a disk file. One prompt is given:

FILE NAME: ____

The file name may have up to eight characters and may have a one- to three-character extension (e. g., TEST.JOE). The file name should be as descriptive as possible

---

*The ground correction factor tells the program whether the firing will be over normal ground, soft ground, or water.

**A=add; D=delete; L=list; S=save; E=end.

TARGET POINT DATA:

Column(s)	Data
1	End of Target point data? Asterisk (*) => last line of TP data Blank => not the last line
3-5	Target Point ID
7-12	X-coordinate (meters, from grid map) of TP
13-18	Y-coordinate (meters, from grid map) of TP
23	Ground correction factor 0 => use default, 1.5 dB

General:

1. As with the Firing Point data, there may be no blank lines in the data file.

2. The example target point data file is 572 bytes in length. This is the typical size expected, i.e. there are usually about 25 target points at a typical installation.

so it can be recognized easily in the future. All options except END may be repeated as often as needed.

Firing Point Data

When sound occurs only at a firing point, the user must determine whether it is caused by an explosion at that point (e. g., a demolition charge) or if it results from a weapon propelling a projectile that makes no noise upon impact at its target point (e. g., an illumination round). In the first case, only the firing point coordinate is needed; in the second case, both firing and target point coordinates are required, even though there is no sound at the target. This is because noise produced by a weapon is associated with a directivity pattern that characterizes the variation in sound pressure level around the weapon. The degree of variance depends mostly on the weapon's physical characteristics. However, a projectile or demolition produces noise omnidirectionally from its source.

Firing point data that must be input include the x and y coordinates (i. e., installation grid map coordinates of the firing point) and the ground correction factor (in dB). The default value for the ground correction factor is 1.5 dB. There is a limit of 300 firing points. Also, the following must be input for each weapon fired: gun type code, number of day firings, number of night firings, minimum charge zone, maximum charge zone, corresponding target ID, presence or absence of noise at the target, and the height (in feet) above or below the ground of the firing. The number of weapons being fired at a given firing point is limited to 50. Therefore, to enter more than 50 weapons at a firing point, the user should construct several firing points at the same x and y coordinates.

The first prompt for firing point data is:

DO YOU WANT TO INPUT FROM A FILE? ____

As in the case of target point data, the user can enter all or part of his firing point data from a previously created file. A choice of options is the next prompt, regardless of the response (Y or N) to the previous question.

ADD, DELETE, LIST, SAVE, OR END? ____

This prompt is repeated until the user responds with E (for END), which sends him to the module input section of EDITOR. The remaining options (A, D, L, and S) operate as follows. ADD (entered as A) allows the user to append an additional firing point and its associated weapons to the in-memory list of firing points. For the firing point, the following prompts are used:

FIRING POINT ID: ____

LOCATION, X-COORDINATE ____

LOCATION, Y-COORDINATE ____

GROUND CORRECTION FACTOR (dB) [1.5]: ____

The firing point ID is a one- to three-character name (e. g., FP1 or F33). There must be at least one weapon fired at each firing point. For each weapon, the following prompts are used to solicit the appropriate data from the user.

FIRING POINT DATA:

Line 1:

Column(s)	Data
3,4,5	Firing point ID
7-12	X-coordinate (meters, from grid map) of Firing Point
13-18	Y-coordinate (meters, from grid map) of Firing Point
23	Ground correction factor for Firing Point (0. = default of 1.5 dB)

Lines 2 through 6:

Column(s)	Data
1	Asterisk (*) => last line for this Firing Point; Blank => not last line
19,20	Gun type code
21-24	Number of daytime firings for this gun type
25-28	Number of night-time firings for this gun type
30	Minimum charge zone used for this gun type
32	Maximum charge zone used for this gun type
33-35	Target Point ID
36	Noise at the Target Point? 0 => noise at Target point 1 => no noise at target point
37-41	Height of explosion (ft) at target point

General:

1. There may be no blank lines in the data file. In the example, the first line of the file is "3A1 50170., etc", and the last line is "* 2 11 etc." Blank lines in the data file will cause a run-time error, and abort execution.

2. The example firing point data file is 1024 bytes in length. A Firing Point data file for a typical installation would be approximately 20 kilobytes in length.

3. The program will accept a maximum of 9999 firings (day or night) for any particular weapon and firing point. If there are 10,000 or more firings, split the number and enter them as two separate (identical) gun types, target points, etc.

GUN TYPE (CODE): ___

NUMBER OF DAY FIRINGS [0]: ____

NUMBER OF NIGHT FIRINGS [0]: ____

MIN CHARGE ZONE: ____

MAX CHARGE ZONE: ____

CORRESPONDING TARGET ID: ____

IS THERE NOISE AT THE TARGET? ____

HEIGHT (IN FEET): ____

ARE THERE MORE GUN TYPES FOR THIS ID? ___

The gun type is limited to those that were selected previously (see p 10). Both the minimum and the maximum charge zones are limited by the range of zero through 10 inclusive; the minimum must be less than or equal to the maximum. The corresponding target ID must either be one of the valid target IDs entered (see p 15) or blank. A blank response indicates that the firing point sound is omnidirectional (i. e., demolition or explosion) and that there is no noise at the target. The question about whether there is noise at the target is prompted only for nonblank corresponding target IDs. The program accepts only Y and N as valid responses. The height data, if applicable, are entered as negative for below ground and positive for above ground. Finally, the user is prompted for additional weapon firings at the firing point. Again, only Y and N are valid responses.

The DELETE option (typed as D) removes *all* of the information currently in RAM *for a given firing point.* The data removed include information both about the actual firing point and for each weapon fired from that firing point. It has only one prompt:

FIRING POINT ID: ____

Because of the voluminous amount of data that could be entered for firing points, the LIST option (entered as L) will list the data only for a given firing point. Of course, LIST can be enacted many times to produce the desired results. Only one prompt is used:

FIRING POINT ID: ___

The user may permanently save, on disk, whatever portion of his firing point data that is currently in-memory by invoking the SAVE option (entered as S). The program prompts only for a file name; this file name has the same characteristics/restrictions as those used in the target data.

FILE NAME: ____

LCDN Program

Each module of the LCDN program contributes either directly or indirectly to producing LCDN contours for an installation or a portion of an installation. The database for the program (see p 10) for a description of the data) is a description of the area and

its noise sources (i. e., the location of firing points, targets, blast sites, and materiel involved in producing the noise). Use of the program modules requires instructions in the form of input from the user. The EDITOR program accepts this input and passes it to LCDN by a disk file called BNOISEIN.DAT. Input files, such as the database file (TAPE7.DAT) or a file containing intermediate results from another module, are also necessary. Each module produces a printed report consisting of:

1. Module name

2. Input values supplied by the user and/or default values supplied by the program

3. Module-specific output

4. Module execution time.

The LCDN program asks the user to specify the disposition of printed output. The prompts give the user three choices:

PRINTED OUTPUT IS TO BE DIRECTED TO:

1 - SCREEN

2 - LINE PRINTER

3 - FILE

ENTER CHOICE: ____

The user can direct the output to the monitor (screen), the line printer, or to a disk file for later printing or editing. If the user chooses option 3, he is then prompted for a file name:

ENTER FILE NAME: ____

The file name is constructed like the ones used in target and firing point data saves (see pp 15, 17).

Input to the modules is read by the EDITOR preprocessor. With a few exceptions, LCDN will accept module execution in any order; the EDITOR has a fixed order for inputting and executing the modules. (Several of the modules are optional.) Table 4 shows the order of the module execution as well as which modules are required and which are optional. Appendix D provides an example of the output produced by each module.

Although most MicroBNOISE sessions produce plots of CDNL contours, use of the PLOT module is optional. The PLOT module may be repeated as often as necessary to produce the number of plots the user needs. Also, it is repeated automatically when a plot will not fit completely on one sheet of 8½ x 11 paper.

Before data for the first module are input, the system prompts for the following general information:

DO YOU WANT TO INPUT FROM A FILE? ____

FILE NAME: ____

METERS OR FEET? _____

ANY CHANGES? _ _ _

The user can input data from a previously created disk file. If the user chooses to enter data from a file, he must supply the file name and indicate whether data from the file will be changed. In any case, the user must tell MicroBNOISE whether the database coordinates are in meters or in feet. After all module input has been entered and/or modified, the user has the option of saving the newly created module data in a permanent disk file. One or both of the following two prompts are used for this:

SAVE MODULE DATA ON FILE? _____

FILE NAME: _____

The rules for file names (see pp 15-16) also apply here.

BASE Module

BASE generates line segments that the PLOT module can draw on the plotter. It can be used to create an outline of the installation or the portion of the installation for which the user is providing data. It can also be used to draw lines for visual reference in lining up the paper plot with an actual map, or for showing a compass, north arrow, direction, and scale line segment. BASE causes PLOT to draw line segments from coordinate to coordinate, as specified.

Table 4

Order of Module Execution and Optionality

Order	Module	Status
1	MAP	Required
2	BOUNDS	Required
3	BASE	Optional
4	FORMA	Required
5	PUDDLE GRID	Optional
6	POINT	Optional
7	SCATTER	Optional
8	LOCATOR	Optional
9	PLOT	Optional

FILES REQUIRED TO RUN MICROBNOISE

The following files should be in the BNOISE directory on the hard disk:

1. BNOISE.BAT	Batch file that invokes various executable (.EXE) programs
2. NASAPLOT.BAT	Batch file called by BNOISE.BAT (or can be used individually) to make the plots.
3. EDITOR.EXE	Program that prompts for data input and used to edit various data files.
4. TABGEN.EXE	Program that generates the table of noise levels, as a function of distance and inversion factors, from the standard (5#) C-4 detonation. Also calculates various correction factors. Runs only once, produces TAPE20.DAT which resides in BNOISE directory.
5. NASAMAIN.EXE	Builds the data file (TAPE55.DAT) to be used by NASAPLOT.BAT when plotting contours.
6. LCDN.EXE	Program that calculates the noise levels from target data, firing point data and TABGEN data (TAPE20.DAT).
7. GUNTABLE.DAT	Data file containing gun type codes, directivity data for each code, and correction factors.
8. TABGENIN.DAT	Contains standard inversion and correction factors used by TABGEN.EXE.
9. Target Data File (e.g. TARGET01.DAT)	Contains target ID's and coordinates. Filename is prompted for from EDITOR during first part of run.
10. Firing Point Data File (e.g. FIRING01.DAT)	Contains firing point IDs, coordinates and firing activity. Filename is prompted for from EDITOR during the MicroBNOISE run.
11. Module Data File (e.g. MODULE01.DAT)	Contains data that determines what output is desired (reports, plots) and the parameters needed to produce the specified output. Filename is prompted for from EDITOR near end of the MicroBNOISE input session.

BASE can accept data for several continuous line segments. (A continuous line segment is two or more points connected consecutively by a line.) Since this module is optional, the first prompt is:

ANY BASE MODULE DATA? ____

Like all other questions written to elicit a "yes" or "no" response, this question will accept only Y or N. The following two prompts are used for each of the first two points of every continuous line segment and for any additional points in the line segment:

X COORDINATE: _____

Y COORDINATE: _____

The following question is asked after the first two points have been input and again after each successive point in a given outline is indicated:

IS THIS THE END OF A CONTINUOUS LINE? _____

Y lifts the pen, and N leaves the pen down to continue drawing the line. A response of Y produces a new question.

IS THIS THE LAST LINE? _____

A response of Y channels the user to the next module. An N response prompts for the next set of coordinates.

BOUNDS Module

BOUNDS uses map coordinates to set the limits of the total area encompassed by CDNL calculations and to which the plot drawing will be limited. It defines the area in which the user is interested. It has four prompts:

MINIMUM X COORDINATE: _____

MINIMUM Y COORDINATE: _____

MAXIMUM X COORDINATE: _____

MAXIMUM Y COORDINATE: _____

Coordinates should be taken from the installation grid coordinate map.

FORMA Module

This module tabulates target and firing point information from the database and compresses data into the form required by PUDDLE GRID (see p 22). FORMA requires input of the charge averaging technique and the ground correction. The two prompts are:

CHARGE AVERAGING TECHNIQUE (MAX, IAVE, CAVE): _____

GROUND CORRECTION (dB) [1.5]: _____

Depending on the technique specified, the charge figure used in calculations may be:

1. The weight corresponding to the maximum charge zone (MAX)

2. The weight corresponding to the average of the maximum and minimum charge zones rounded to the next highest integer (IAVE)

3. The average of the two weights corresponding to the maximum and minimum charge zones (CAVE).

LOCATOR Module

This optional module labels target and firing points on the plot. The user must supply the following information:

ANY LOCATOR MODULE DATA? ___

"ALL," TARGET," OR "FIRING"? ____

PRINT ID ON PLOT? ____

PRINT COORDINATES? ____

SIZE OF LETTER [0.14 (INCHES)]: ____

ROTATION OF LETTERS [0 DEG] ____

If the user selects this module, he must choose whether to label the target points, the firing points, or both the target and firing points. Targets are labeled with an "X" and firing points are labeled with an "O" on the plot. The user can either specify the size and rotation of these two letters, or the defaults of 0.14 in. and 0 degree can be used. The user may also have the target or firing point ID written on the plot next to the "X" or "O." Another option is to place the x and y coordinates (the installation grid map coordinates) of the target or firing point adjacent to the ID on the plot.

MAP Module

MAP performs elementary error checking on the database information. It also lists the input data and generates cross-reference tables. To determine what the user wants printed, the system asks six questions:

PRINT DATA BASE INFORMATION? ____

PRINT TARGET VS FIRING POINT TABLE? ____

PRINT TARGET VS GUN TYPE TABLE? ____

PRINT GUN TYPE VS TARGET TABLE? ____

PRINT GUN TYPE VS FIRING POINT TABLE? ____

PRINT "EXTRANEOUS DATA" MESSAGE? ____

The user must also supply the amount of information in the database in response to the following prompt:

NUMBER OF DAYS OF INFORMATION IN DATA BASE [1]: ____

If a user wants to determine how many points PUDDLE GRID will generate for a specified grid size, he may request this information from the MAP module. The user must specify the number of various grid sizes he wishes to try, and then list the various grid sizes. The MAP output will list the number of points that the chosen grid sizes will generate. Two prompts are given:

NUMBER OF GRID SIZES TO BE TESTED: ____

GRID SIZE: ____

PUDDLE GRID Module

The "grid size" specification in the PUDDLE GRID module specifies how often, in terms of x and y coordinates, the CDNL values are to be computed (e. g., reasonable values are every 1000 m or 3000 ft if the overall land area included in the contour is fairly large). The smaller the values used, the finer the grid size, the smoother the contour produced, and the longer the computation period. This is because the program has a greater number of actual points for calculating the CDNL and plotting, and fewer points to approximate. Cutting the grid size in half will cause four times as many points to be computed and will take about four times longer to run. The prompt for the grid size is:

GRID SIZE [2000]: ____

This grid-size value must be an even multiple of 250. There cannot be more than 100 grid points in the y direction and 50 grid points in the x direction.

The "inversion factors" specification in the PUDDLE GRID and POINT modules provides a set of meteorological data to the program. Weather conditions, especially temperature, affect the way sound propagates throughout the atmosphere.[4] Currently, the MicroBNOISE program does not consider the effects of wind. However, it does account for temperature inversions. Therefore, the user must provide appropriate inversion data for the noise study location. Inversion tables available from the National Weather Service summarize radiosonde observations made at selected weather stations. Table 5 summarizes these temperature data. This table can be used to determine the temperature inversion factors required by PUDDLE GRID and POINT. The user should locate the city that is geographically closest to and meteorologically most like the location of interest. The number in that row under the column labeled "SURFACE" is the value used for inversion factor 1. The second factor is obtained under the "1-500 m" column; the third factor is found under the column labeled "1-3000 m."

Prompts for the inversion factors are:

INVERSION FACTOR 1 (SURFACE): ____

INVERSION FACTOR 2 (1-500 m): ____

[4] USA-CERL Technical Report N-98, Vol II.

Table 5

Temperature Inversion Factors

Location	Surface	1 to 500 m	1 to 3000 m	Location	Surface	1 to 500 m	1 to 3000 m
Albany, NY	45.1	20.1	45.0	Little Rock, AR	64.0	13.4	29.8
Albuquerque, NM	71.9	6.0	11.4	Medford, OR	76.7	5.1	13.9
Amarillo, TX	73.2	14.2	21.9	Miami, FL	60.6	6.7	24.3
Anchorage, AK	55.2	13.3	25.1	Midland, TX	65.8	15.5	27.9
Annetle, AK	30.9	3.0	26.2	Montgomery, AL	66.5	12.1	27.0
Athens, GA	70.1	13.3	23.5	Nantucket, MA	46.6	18.3	46.5
Barter Island, AK	48.1	34.3	48.7	Nashville, TN	66.0	10.5	27.8
Bismark, ND	64.3	18.0	32.0	New York, NY	27.8	22.0	56.8
Boise, ID	79.7	4.5	8.5	Nome, AK	65.7	8.4	26.2
Brownsville, TX	61.0	9.5	30.4	North Platte, NE	65.7	16.5	29.3
Buffalo, NY	44.9	10.5	39.4	Oakland, CA	43.4	21.3	49.0
Burwood, LA	17.1	5.6	28.9	Oklahoma City, OK	63.4	17.0	30.9
Cape Hatheras, NC	44.7	9.8	36.6	Omaha, NB	64.1	19.6	32.6
Caribou, ME	44.2	20.6	45.6	Peoria, IL	68.2	14.4	27.6
Charleston, SC	69.7	14.2	23.0	Pittburgh, PA	58.2	10.5	32.9
Columbus, MO	65.2	14.5	29.2	Point Barrow, AK	46.7	34.3	49.9
Dayton, OH	60.7	11.6	29.6	Portland, ME	55.0	17.6	36.6
Denver, CO	82.8	4.3	12.3	Rapid City, SD	74.8	7.7	19.3
Dodge City, KS	72.6	15.4	24.1	St. Cloud, MN	55.3	21.4	39.9
El Paso, Tx	65.6	4.7	14.1	Salem, OR	63.6	7.3	22.3
Ely, NV	91.6	.6	2.8	Salt Lake City, UT	83.4	3.7	6.4
Fairbanks, AK	71.5	6.8	17.6	San Antonio, TX	34.6	14.0	51.1
Flint, MI	53.2	15.2	36.5	San Diego, CA	47.3	26.8	50.0
Fort Worth, TX	45.8	25.0	48.0	San Juan, PR	44.7	1.3	24.5
Glasgow, MT	73.9	10.9	20.1	Santa Monica, CA	42.2	26.6	53.0
Grand Junction, CO	84.0	1.3	3.7	Sault Sainte Marie, MI	53.9	15.4	36.5
Great Falls, WI	59.0	13.7	33.6	Seattle, WA	52.2	5.2	25.0
Green Bay, WI	59.0	13.7	33.6	Shreveport, LA	55.9	17.5	36.0
Greensboro, NC	65.9	12.4	25.1	Spokane, WA	70.0	14.1	19.0
Hilo, HI	85.1	.3	8.1	Tampa, FL	67.7	7.6	18.0
Huntington, WV	60.0	7.3	30.6	Totoosh Island, WA	23.1	12.1	43.7
International Falls, MN	59.6	14.4	33.7	Topeka, KA	53.5	23.6	40.9
Jackson, MS	64.2	15.8	29.8	Tucson, AR	89.6	1.4	4.0
Jacksonville, FL	63.7	11.2	22.8	Wallops Island, VA	57.9	13.8	34.2
Lake Charles, LA	79.2	9.1	18.5	Washington, DC	67.0	7.7	26.9
Lander, WY	84.6	1.2	6.1	Winnemicca, NV	88.3	1.5	3.7
Las Vegas, NV	84.2	1.1	5.8	Winslow, AR	88.0	2.1	4.9
Lihue, HI	24.0	.1	62.6	Yukatat, AK	57.1	2.1	14.8

INVERSION FACTOR 3 (1-3000 m): _____

The user must also specify which noise to include. The choices are: day noise only, night noise only, or both day and night noise. Day is defined as 0700 to 2200 hours, and night is 2200 to 0700 hours. The prompt for this information is:

"DAY," "NIGHT," or "BOTH":_____

POINT Module

POINT calculates the C-weighted day-night level (CDNL) for specific locations. The user retrieves the inversion factors from Table 5. Input for the inversion factors and for which noise to include is exactly the same as that used in PUDDLE GRID. Specific locations must be input to the program for this module. The prompts are:

NAME OF X, Y LOCATION: _____

X COORDINATE: _____

Y COORDINATE: _____

AND MORE POINTS? _____

This module is used solely to produce a report, and does not affect the contour plot. The location name asked for in the prompt is a one- to nine-character name of the point whose coordinates are being supplied. Up to 30 points may be input.

PLOT Module

This module combines output from appropriate modules for use by the NASAPLOT program to create actual plotter CDNL contours. PLOT requires more input than any other module because the user is given wide flexibility in selecting what is to be plotted and how it is to be plotted. Most of the information requested concerns the scaling and annotation of the plot. The prompts for this module appear in four logical groups: output, scale, contours, and additional text.

Output from one to four of the modules (PUDDLE GRID, LOCATOR, SCATTER, BASE) may be selected for a given plot. The following questions will appear only if the module has been selected.

USE PUDDLE GRID OUTPUT? _____

USE LOCATOR OUTPUT? _____

USE SCATTER OUTPUT? _____

USE BASE OUTPUT? _____

A response of Y to any of these questions will provide output that plots data from that specific module.

The user has several ways to scale the plot. The first is called "scale" and represents the ratio of plot size to actual size (e. g., 1:50000 translates to 1 equals 50 000 m). The user is prompted by:

SCALE [50000]: _____

The value of the scale must be between 1000 and 100,000. The second method allows the user to employ percentages of the actual size independently in the x and the y directions. These values must be between 0.01 (1 percent) and 9.0 (900 percent) of the plot size. The prompts* are:

PERCENT X [1.0]: _____

PERCENT Y [1.0]: _____

Generally, the x and y values should be equal to avoid distortion. The third method is called magnification; here, the user can magnify or shrink the plot in both directions simultaneously. Again, the factor must be within the range of 0.01 to 9.0. The prompt is:

MAGNIFICATION [1.0]: _____

The user must specify or choose the default values for (1) percent smoothing of the contour lines, (2) which contours are to be plotted, and (3) which contours are to be labeled. Except for percent smoothing, the other data are self-explanatory. Circular arc smoothing is performed for all contour lines drawn. The "percent smoothing" value input represents a percentage of the plot's grid size; the recommended value for use in NASAPLOT is one-third (0.333). The following prompts are used:

PERCENT SMOOTHING [0.333]: _____

FIRST CONTOUR LEVEL TO BE PLOTTED [65]: _____

LAST CONTOUR LEVEL TO BE PLOTTED [75]: _____

CONTOUR INCREMENT [10]: _____

DO YOU WANT LABELS? _____

FIRST CONTOUR TO BE LABELED [65]: _____

LAST CONTOUR TO BE LABELED [75]: _____

LABEL INCREMENT [10]: _____

The default values for the first and last contours to be plotted (labeled 65 and 75) are the values most normally used, since these contours define the boundary between Zone I and Zone II (65 dB) or between Zone II and Zone III (75 dB). Since Army policy addresses noise impacts in terms of Zones I, II, or III,[5] the contours are usually not labeled. Instead, a green pen is used to plot the 65-dB contour to show the Zone I/II

*Numbers in brackets are default values.

[5]AR 200-1, *Environmental Protection and Enhancement* (Department of the Army, 15 June 1982), Chapter 7.

boundary, and a red pen is used to plot the 75-dB contour to show the Zone II/III boundary. Text may be added later to label the zones. The user may display on the plot at any location, size, and slant of the lettering. The following prompts are issued for text input (e. g., labeling a contour map, such as "Scenario A, night firing until 2330 hrs; assuming 200 events, 3 green bags") and associated data parameters:

ANY ADDITIONAL TEXT TO DISPLAY? ____

STARTING LOCATION OF TEXT -- X COORDINATE: ____

STARTING LOCATION OF TEXT -- Y COORDINATE: ____

HEIGHT OF TEXT: ____

ANGLE OF TEXT [0 DEG]: ____

ARE COORDINATES PLOTTER COORDINATES? ____

TEXT (FIRST 38 CHARACTERS): ____

MORE TEXT FOR THIS LOCATION? ____

TEXT (NEXT 69 CHARACTERS): ____

ANOTHER TEXT LOCATION? ____

Coordinates for the start of the text may be input in plotter coordinates (inches) or in grid map coordinates (meters or feet).

SCATTER Module

SCATTER allows the PLOT module to create a scattergram (dots) of noise sources; the number of dots is proportional to the blasting activity at that point. There will be one dot for each noise source that occurs per day according to the data specified by the user. The dots of the scattergram will have a normal distribution, with a standard deviation equal to the user-supplied value. The center of the normal distribution will be at the target or firing point location. No dots are allowed outside the limits established by the BOUNDS module.

The first part of the SCATTER input concerns selecting the points. Points may be displayed for targets and/or firing points; they may be for day, night, or both day and night firings; they may be for all weapon types or for selected weapons. The following prompts are given:

SCATTER INFORMATION COLLECTED FOR TARGETS? ____

SCATTER INFORMATION COLLECTED FOR FIRING POINTS? ____

DAY (D), NIGHT (N), OR BOTH (B) DATA: ____

DO YOU WANT TO SPECIFY GUN TYPES? ____

GUN TYPE: ____

MORE GUN TYPES? ___

The gun type should not be left blank; up to 28 different gun types may be selected. A multiplier (a default value of 1) is also required; scatter points will be multiplied by this factor before being divided by the number of days of data in the database.

MULTIPLIER [1]: ___

The standard deviation, expressed in meters or feet (whichever the user has chosen previously), must also be input; it should be roughly one-fourth of the actual size of the target point (impact area) or firing line. The following prompt is given:

STANDARD DEVIATION [300] ____

NASAPLOT Program

NASAPLOT is a general-purpose contouring program specifically linked to LCDN to draw noise contours, installation boundaries, text, and scattergrams. The user's only interactions with this program are specifying which communications port is being used for the plotter and changing the pens and paper. The following prompts are issued:

ARE YOU USING "COM1" OR "COM2" FOR YOUR PLOTTER? ____

INSERT PAPER IN PLOTTER

PUT BLACK PEN IN SLOT 1 (LEFT)

PUT GREEN (OR RED) PEN IN SLOT 2 (RIGHT)

CHANGE PEN 2

CHANGE PAPER

"COM1" and "COM2" refer to the computer's communication (RS-232 C, or serial) ports. If the computer is equipped with a modem for communications over telephone lines, the "COM1" port is usually dedicated to this. The plotter would then be connected to "COM2." If the plotter does not respond when a plot is expected, the wrong port may have been specified.

The user may change pens for every level of contour plotted to make the various contours different colors. Also, after the plots are completed, the user can produce additional copies, as provided by the following prompt:

ANOTHER COPY OF THE PLOT(S)? ___

COMPUTER OUTPUT AND PLOTTER SETUP

Computer Output Setup

MicroBNOISE expects to communicate with a Hewlett-Packard compatible plotter via an RS232-C I/O port. The computer output setup is accomplished from the software using the DOS "MODE" command.

There are two methods for setting the output MODE:

1. Set the MODE from the root directory before entering the BNOISE directory to start a MicroBNOISE session. The DOS string to be used is:

   MODE COM1:96,N,8,1,P

   This sets the serial port COM1 (or COM2 if that port is substituted above) to 9600 baud, no parity, 8 data bits, 1 stop bit, and instructs the serial interface to retry data transmission continuously if a time out error occurs.

   This method may produce an error (nonfatal) during execution of MicroBNOISE. This is because the MODE command is part of the NASAPLOT.BAT file called by BNOISE.BAT; if the PATH has not been set to include both the root directory and the BNOISE directory, the MODE command will not be available from the BNOIISE directory. See below.

2. This method avoids the error described above, but requires that AUTOEXEC.BAT file in the root directory (accessed during boot-up of the computer) be changed. The AUTOEXEC.BAT file will be modified to contain a PATH statement that includes both the root directory (C:\)and the BNOISE directory (\BNOISE). The DOS string that should appear in the AUTOEXEC.BAT file is:

   PATH = C:\WS;\TERM;\BNOISE;C:\

   where \WS is the WordStar directory, \TERM is the communications (terminal) directory, \BNOISE is the MicroBNOISE directory, and C:\ is the root directory.

   Setting the PATH in this way allows the MODE statement in the NASAPLOT.BAT to be executed, since the computer has been told how to get to the root directory to fetch the MODE statement code.

Plotter Setup:

The plotter must be expecting the same data format the computer is sending. The MODE statement above set the computer's output format. The plotter format is set with switches on the back of the plotter. (H-P 7470A, 2 pen plotter setup is discussed here.)

Eight small switches are located near the cable socket on the back of the plotter (see pp 13-15 of the 7470A Operators Manual).

The following table shows the settings to be used to be compatible with the MODE set above.

Switch	Position (0 or 1)	Use
S1	0	No parity checking performed
S2	0 or 1	Sets odd or even parity; doesn't matter since S1 is set to no parity.
D/Y	0 (or D)	Direct connect of plotter to computer
A4/US	1 (or US)	Maximum plotting limits (8½" X 11")
B4	1	Sets baud rate at 9600 and 1 stop bit
B3	0	
B2	1	
B1	0	

Thus, using MODE COM1:96,N,8,1,P and the switch settings 0,0,0,1,1,0,1,0 sets both the computer and the plotter to 9600 baud, no parity, 8 data bits and one stop bit.

3 DESCRIPTION OF A MICROBNOISE USER SESSION

Data used in the example problem described in this chapter are for the hypothetical installation "SHOW" for the month of June (30 days). A map of the installation in metric coordinates was provided with the data. Four types of activities occurred, with five sites involved in the activities (weapons were fired from three firing points toward two target points).

The first activity used a 155-mm self-propelled howitzer (M109) to fire 160 rounds from firing point 2 (located at coordinates 35000, 20000) to target point 2 (located at coordinates 32000, 25000). One hundred and fifty rounds were fired during the day (0700 to 2200 hours), and 10 were fired at night (2200 to 0700 hours). Charge zones 4 and 5 were used for this weapon.

The second activity used an 81-mm mortar, which fired 325 rounds from firing point 1 (located at coordinates 29000, 23000) to target point 2. All 325 projectiles were nonexploding (i. e., smoke or illumination). Three hundred rounds were fired during the day, and 25 were fired at night, using charge increments of 5 to 7.

The third activity involved demolitions at firing point 3 (located at coordinates 32000, 28000). There were 100 daytime explosions, each of which exploded 15 lb (6 kg) of ammunition.

The last activity used a nonstandard weapon (not listed in Table 1). It fired 17 night rounds from firing point 1 to target point 1 (located at coordinates 27000, 25000), using charge zones 3 and 4. All rounds exploded 100 ft (30 m) above the target. The user learned that this weapon fires a projectile containing 10.5 lb (4.8 kg) of explosive and has six charge zones containing 1.2, 3.4, 5.7, 7.3, 9.2, and 12.1 lb (0.54, 1.54, 2.58, 3.31, 4.17, and 5.49 kg) of propellant in zones 1 through 6, respectively, and that its directivity pattern is the same as that of the 105-mm self-propelled howitzer (M102).

The user wants to generate a set of CDNL contours for this set of data and have an outline of the installation drawn on them for reference. He also wants an indication of the activities' magnitudes and location.

Appendix C shows the sequence of input used in the installation "SHOW" example run. The following sections discuss the input data and module input for this example.

Input Data

Tables 2, 3, and 4 show information for the first three gun types, which correspond to standard weapons used in this example. The last weapon is not on the list, since it is not a standard weapon; therefore, the user must create his own weapon code and gun-type data for it from the information received. A weapon code of 80 was chosen and input; the rest of the information was entered as prompted. Target point data were then created; short target point names were made up to fit into the input field's maximum width of three characters.

Two types of data--location and gun type--are associated with each firing point. In the example, the location information received from the installation and the shortened firing point names created to fit into the input field were entered. The gun type, number

of day and night firings, minimum and maximum charge zones, corresponding target ID, and height were also entered for all of the chosen firing points.

Appendix C illustrates input for a sample session of MicroBNOISE.

Module Selection

The next portion of the input consisted of the module data, which tells the computer what it must do with the input data described in the previous section. In this example, the data were checked, and two plots were generated. The first plot had an outline of the installation, with target and firing points marked, and showed CDNL contours for the area. The second plot provided the installation outline and noise event density plot (scattergram). The MAP, BOUNDS, BASE, FORMA, PUDDLE GRID, SCATTER, LOCATOR, and PLOT modules were all used to produce the two plots.

Output Received

The user received printed output provided in Appendix D and the two plots shown in Figures 2 and 3. The printed output summarizes all the input entered, showing how many gun types, targets, and firing points were input. It provides statistics on the number of total firings and the number of firings per day for both day and night. Information is also given about minimum and maximum charge zones and charge weight. The average weight of firings is given in pounds, and the maximum height and depth are given in feet. The maximum and minimum values for coordinates are given, along with the coordinate pair in which each set of values occurs.

The user also received the four cross-reference tables (see Appendix D) requested in the MAP module. The first cross-reference table (targets by firing points) provides the average number of rounds fired by day for each target and firing point combination. The second table lists targets by gun type and provides the average total weight exploding at each target for each gun type. The third table provides the same information given in the second table, but in a different order--gun types by targets. The last table lists gun types by firing point, giving the average daily charge weight of each combination.

The rest of the output given in Appendix D is for the options chosen from the various modules. Output from PUDDLE GRID provides a table of contour values for each grid point.

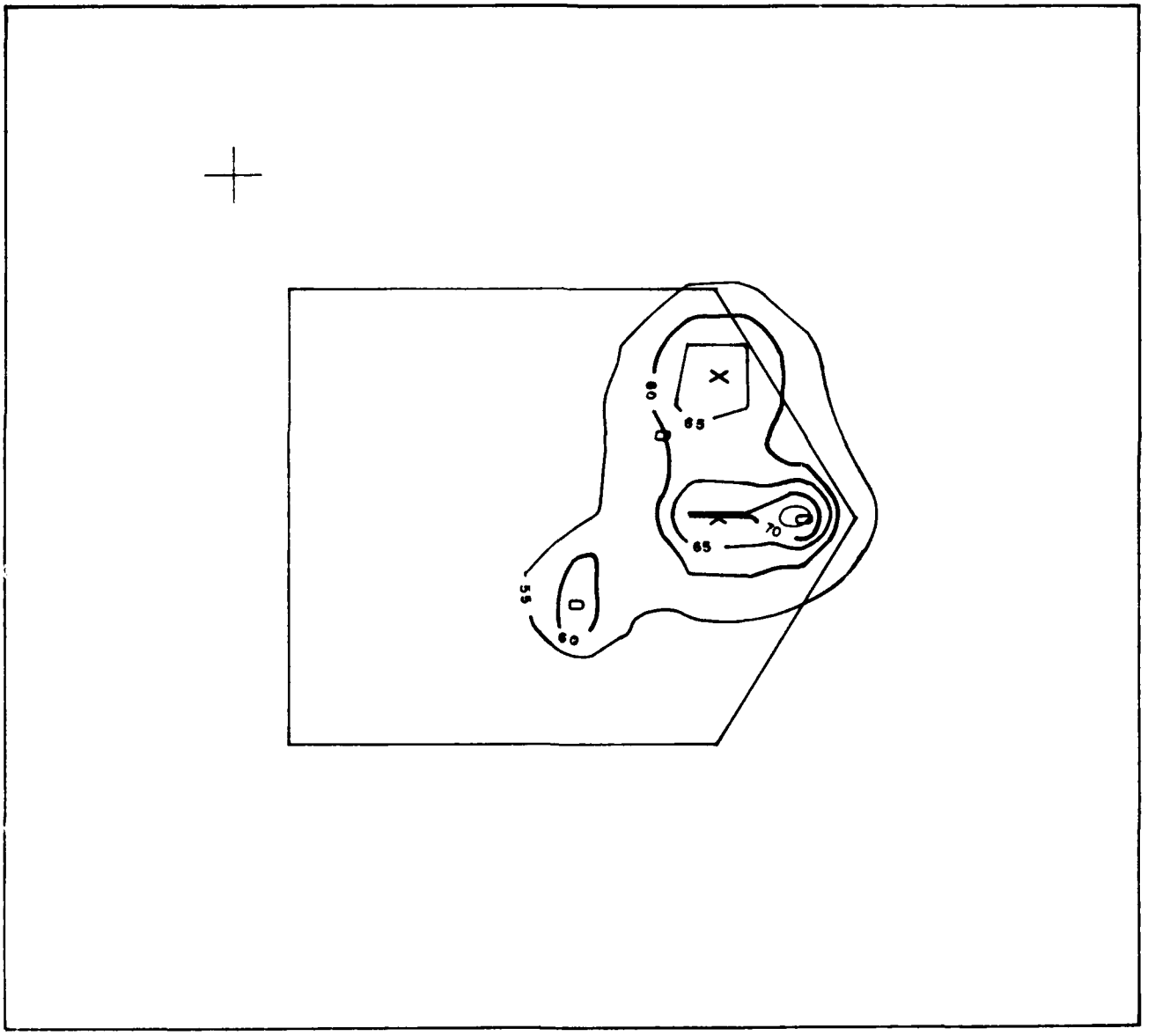

Figure 2. CDNL contours for installation "SHOW."

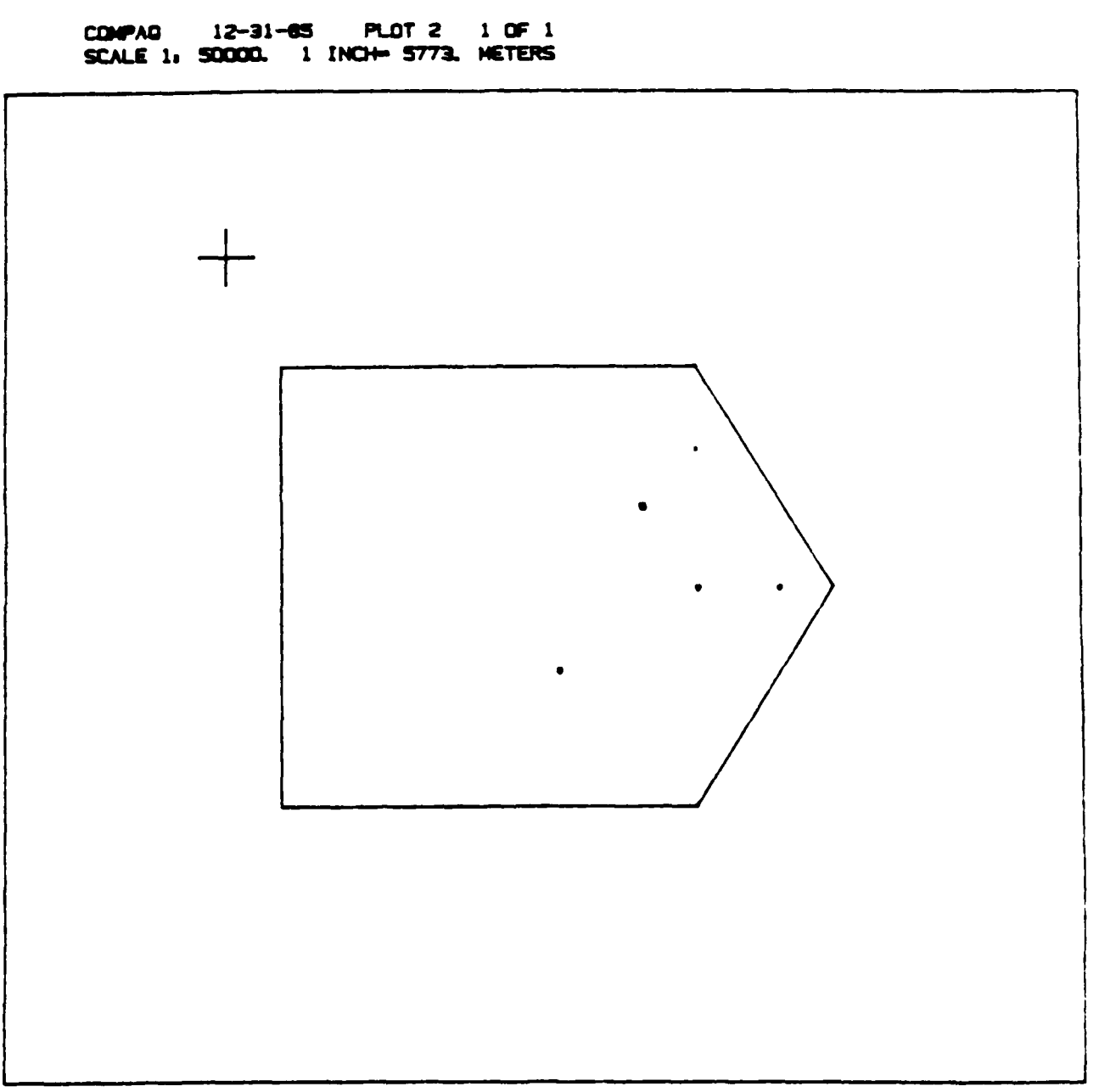

Figure 3. Scattergram for installation "SHOW."

EDITING THE DATA FILES

It is generally most convenient and efficient to edit a baseline data file to produce a file for a particular scenario/situation. Hence, baseline firing point and target files should be generated and saved to a write protected, back up diskette. Then a file can be made for a particular situation by copying the baseline file (to a different file name) and editing the new file to reflect the situation at hand.

Likewise, a set of MODULE.DAT files can be generated to produce some "standard" output requests. One such file might only produce the installation outline and a few alignment marks. Another might produce the installation outline, alignment marks and the noise contours.

The data files (e.g., guntable, firing point) must not contain control characters. Therefore, any editing of the data files must not introduce control characters. Most word processor programs (e.g. WordStar) use control characters to pass formatting information for paragraphing, hypenation, etc.; however, these programs usually have a "nondocument"option that does not introduce the control characters.

Alternately, the operating system line editor may be used. MS-DOS and PC-DOS both refer to this editor as EDLIN, and it is designed specifically to avoid control characters.

Miscellaneous Notes

1. During a MicroBNOISE session, execution can be halted by using control-C from the keyboard. This suspends execution, and you are asked if you want execution terminated. If so, the job is aborted and you are returned to DOS.

2. From DOS, control-S halts scrolling; strike any key to resume scrolling. This can be done while examining a data file. [Use "type <filename>" to examine the file <filename>].

3. Copies of contours may be produced by running NASAPLOT.EXE. However, only the most recent plots may be made using this method since NASAPLOT.EXE uses the data in TAPE55.DAT which is overwritten each time MicroBNOISE is run.

4 SUMMARY

This report has described how to use MicroBNOISE--a computer program that characterizes impulsive noise generated by military activities and operations. A detailed example of a user session was provided to illustrate the steps required to use the program. The program will be useful to installation planning personnel who must work with the public and local government to minimize noise-sensitive development near noise-generating Army activities.

REFERENCES

AR 200-1, *Environmental Protection and Enhancement* (Department of the Army, 15 June 1982), Chapter 7.

Little, Lincoln L., Violet I. Pawlowska, and David L. Effland, *Blast Noise Prediction Volume II: BNOISE 3.2 Computer Program Description and Program Listing*, Technical Report N-98/ADA099335 (U.S. Army Construction Engineering Research Laboratory [USA-CERL], 1981).

Schomer, Paul D., et al., *Blast Noise Prediction Volume I: Data Bases and Computational Procedures*, Technical Report N-98/ADA099440 (USA-CERL, 1981).

Schomer, Paul D., *Predicting Community Response to Blast Noise*, Technical Report E-17/ADA773690 (USA-CERL, 1973).

APPENDIX A:

FILES NEEDED TO RUN MICROBNOISE

The following files provided with the program are required to use the MicroBNOISE system:

BNOISE.BAT

NASAPLOT.BAT

LCDN.EXE

EDITOR.EXE

NASAMAIN.EXE

TABGEN.EXE

GUNTABLE.DAT

TAPE20.DAT

TABGENIN.DAT

These files require 423K bytes of storage on disk or diskettes.

APPENDIX B:

TABLE GENERATION (TABGEN)
(INVERSION FACTORS 74.20%, 8.60%, 18.67%)

```
DAY FOCUS MAX                                                    1
          9        301     100.00    -199.00     DAY FOCUS MAX
     141.10     100.00METER                          100.00      1.00
     132.50    1000.00FEET                           304.80     49.40
     126.60    2000.00FEET                           609.60     79.50
     117.30       1.00MILE                          1609.34    121.66
     107.50       2.00MILE                          3218.69    151.77
      99.10       5.00MILE                          8046.72    191.56
      92.50      10.00MILE                         16093.44    221.66
      89.70      15.00MILE                         24140.16    239.27
      80.60  100000.00METER                        100000.00    301.00
```

```
141.1 140.8 140.7 140.5 140.3 140.1 139.9 139.8 139.6 139.4
139.2 139.1 138.9 138.7 138.5 138.3 138.2 138.0 137.8 137.6
137.5 137.3 137.1 136.9 136.7 136.6 136.4 136.2 136.0 135.9
135.7 135.5 135.3 135.1 135.0 134.8 134.6 134.4 134.3 134.1
133.9 133.7 133.5 133.4 133.2 133.0 132.8 132.7 132.5 132.3
132.1 131.9 131.7 131.5 131.3 131.1 130.9 130.7 130.5 130.3
130.1 129.9 129.7 129.5 129.3 129.1 129.0 128.8 128.6 128.4
128.2 128.0 127.8 127.6 127.4 127.2 127.0 126.8 126.6 126.4
126.2 125.9 125.7 125.5 125.3 125.1 124.8 124.6 124.4 124.2
124.0 123.7 123.5 123.3 123.1 122.9 122.6 122.4 122.2 122.0
121.7 121.5 121.3 121.1 120.9 120.6 120.4 120.2 120.0 119.8
119.5 119.3 119.1 118.9 118.7 118.4 118.2 118.0 117.8 117.6
117.3 117.0 116.7 116.4 116.1 115.7 115.4 115.1 114.7 114.4
114.1 113.8 113.4 113.1 112.8 112.5 112.1 111.8 111.5 111.2
110.8 110.5 110.2 109.9 109.5 109.2 108.9 108.6 108.2 107.9
107.6 107.3 107.1 106.9 106.7 106.5 106.3 106.1 105.9 105.7
105.4 105.2 105.0 104.8 104.6 104.4 104.2 104.0 103.8 103.5
103.3 103.1 102.9 102.7 102.5 102.3 102.1 101.9 101.6 101.4
101.2 101.0 100.8 100.6 100.4 100.2 100.0  99.7  99.5  99.3
 99.1  98.9  98.7  98.5  98.2  98.0  97.8  97.6  97.4  97.1
 96.9  96.7  96.5  96.3  96.0  95.8  95.6  95.4  95.2  94.9
 94.7  94.5  94.3  94.1  93.9  93.6  93.4  93.2  93.0  92.8
 92.5  92.4  92.2  92.0  91.9  91.7  91.6  91.4  91.3  91.1
 90.9  90.8  90.6  90.5  90.3  90.1  90.0  89.8  89.7  89.5
 89.4  89.2  89.1  88.9  88.8  88.6  88.5  88.3  88.2  88.0
 87.9  87.8  87.6  87.5  87.3  87.2  87.0  86.9  86.7  86.6
 86.4  86.3  86.1  86.0  85.8  85.7  85.5  85.4  85.2  85.1
 84.9  84.8  84.7  84.5  84.4  84.2  84.1  83.9  83.8  83.6
 83.5  83.3  83.2  83.0  82.9  82.7  82.6  82.4  82.3  82.1
 82.0  81.9  81.7  81.6  81.4  81.3  81.1  81.0  80.8  80.7
 80.6
```

DAY	FOCUS	MEAN									
	9		301	100.00	-199.00						
	140.60		100.00METER								
	132.10		1000.00FEET								
	124.00		2000.00FEET								
	113.30		1.00MILE								
	102.50		2.00MILE								
	94.10		5.00MILE								
	87.50		10.00MILE								
	84.70		15.00MILE								
	75.60		100000.00METER								

DAY	FOCUS	MEAN									
	2										
	100.00		1.00								
	304.80		49.40								
	609.60		79.50								
	1609.34		121.66								
	3218.69		151.77								
	8046.72		191.56								
	16093.44		221.66								
	24140.16		239.27								
	100000.00		301.00								

140.6	140.3	140.2	140.0	139.8	139.6	139.5	139.3	139.1	138.9
138.8	138.6	138.4	138.2	138.1	137.9	137.7	137.5	137.4	137.2
137.0	136.8	136.6	136.5	136.3	136.1	135.9	135.8	135.6	135.4
135.2	135.1	134.9	134.7	134.5	134.4	134.2	134.0	133.8	133.7
133.5	133.3	133.1	133.0	132.8	132.6	132.4	132.3	132.1	131.8
131.5	131.3	131.0	130.7	130.5	130.2	129.9	129.7	129.4	129.1
128.8	128.6	128.3	128.0	127.8	127.5	127.2	127.0	126.7	126.4
126.2	125.9	125.6	125.3	125.1	124.8	124.5	124.3	124.0	123.7
123.5	123.2	123.0	122.7	122.5	122.2	122.0	121.7	121.5	121.2
121.0	120.7	120.4	120.2	119.9	119.7	119.4	119.2	118.9	118.7
118.4	118.2	117.9	117.7	117.4	117.1	116.9	116.6	116.4	116.1
115.9	115.6	115.4	115.1	114.9	114.6	114.4	114.1	113.8	113.6
113.3	113.0	112.6	112.3	111.9	111.6	111.2	110.8	110.5	110.1
109.8	109.4	109.1	108.7	108.3	108.0	107.6	107.3	106.9	106.5
106.2	105.8	105.5	105.1	104.7	104.4	104.0	103.7	103.3	103.0
102.6	102.3	102.1	101.9	101.7	101.5	101.3	101.1	100.9	100.7
100.4	100.2	100.0	99.8	99.6	99.4	99.2	99.0	98.8	98.5
98.3	98.1	97.9	97.7	97.5	97.3	97.1	96.9	96.6	96.4
96.2	96.0	95.8	95.6	95.4	95.2	95.0	94.7	94.5	94.3
94.1	93.9	93.7	93.5	93.2	93.0	92.8	92.6	92.4	92.1
91.9	91.7	91.5	91.3	91.0	90.8	90.6	90.4	90.2	89.9
89.7	89.5	89.3	89.1	88.9	88.6	88.4	88.2	88.0	87.8
87.5	87.4	87.2	87.0	86.9	86.7	86.6	86.4	86.3	86.1
85.9	85.8	85.6	85.5	85.3	85.1	85.0	84.8	84.7	84.5
84.4	84.2	84.1	83.9	83.8	83.6	83.5	83.3	83.2	83.0
82.9	82.8	82.6	82.5	82.3	82.2	82.0	81.9	81.7	81.6
81.4	81.3	81.1	81.0	80.8	80.7	80.5	80.4	80.2	80.1
79.9	79.8	79.7	79.5	79.4	79.2	79.1	78.9	78.8	78.6
78.5	78.3	78.2	78.0	77.9	77.7	77.6	77.4	77.3	77.1
77.0	76.9	76.7	76.6	76.4	76.3	76.1	76.0	75.8	75.7
75.6									

DAY BASE MAX

9

140.10	100.00METER
131.60	1000.00FEET
123.60	2000.00FEET
111.60	1.00MILE
99.30	2.00MILE
89.00	5.00MILE
84.00	10.00MILE
80.80	15.00MILE
68.60	100000.00METER

301 100.00 -199.00

3

DAY BASE MAX

100.00	1.00
304.80	49.40
609.60	79.50
1609.34	121.66
3218.69	151.77
8046.72	191.56
16093.44	221.66
24140.16	239.27
100000.00	301.00

140.1	139.8	139.7	139.5	139.3	139.1	139.0	138.8	138.6	138.4
138.3	138.1	137.9	137.7	137.6	137.4	137.2	137.0	136.9	136.7
136.5	136.3	136.1	136.0	135.8	135.6	135.4	135.3	135.1	134.9
134.7	134.6	134.4	134.2	134.0	133.9	133.7	133.5	133.3	133.2
133.0	132.8	132.6	132.5	132.3	132.1	131.9	131.8	131.6	131.3
131.0	130.8	130.5	130.2	130.0	129.7	129.4	129.2	128.9	128.7
128.4	128.1	127.9	127.6	127.3	127.1	126.8	126.5	126.3	126.0
125.7	125.5	125.2	124.9	124.7	124.4	124.1	123.9	123.6	123.3
123.0	122.7	122.5	122.2	121.9	121.6	121.3	121.0	120.8	120.5
120.2	119.9	119.6	119.3	119.0	118.8	118.5	118.2	117.9	117.6
117.3	117.1	116.8	116.5	116.2	115.9	115.6	115.3	115.1	114.8
114.5	114.2	113.9	113.6	113.4	113.1	112.8	112.5	112.2	111.9
111.6	111.3	110.9	110.4	110.0	109.6	109.2	108.8	108.4	108.0
107.6	107.2	106.8	106.4	105.9	105.5	105.1	104.7	104.3	103.9
103.5	103.1	102.7	102.3	101.9	101.5	101.0	100.6	100.2	99.8
99.4	99.1	98.9	98.6	98.3	98.1	97.8	97.6	97.3	97.0
96.8	96.5	96.3	96.0	95.7	95.5	95.2	95.0	94.7	94.5
94.2	93.9	93.7	93.4	93.2	92.9	92.6	92.4	92.1	91.9
91.6	91.3	91.1	90.8	90.6	90.3	90.1	89.8	89.5	89.3
89.0	88.8	88.7	88.5	88.3	88.2	88.0	87.8	87.7	87.5
87.3	87.2	87.0	86.9	86.7	86.5	86.4	86.2	86.0	85.9
85.7	85.5	85.4	85.2	85.0	84.9	84.7	84.5	84.4	84.2
84.0	83.8	83.7	83.5	83.3	83.1	82.9	82.8	82.6	82.4
82.2	82.0	81.8	81.7	81.5	81.3	81.1	80.9	80.8	80.6
80.4	80.2	80.0	79.8	79.6	79.4	79.2	79.0	78.8	78.6
78.4	78.2	78.0	77.8	77.6	77.4	77.2	77.0	76.8	76.6
76.4	76.2	76.0	75.8	75.6	75.4	75.2	75.0	74.8	74.6
74.4	74.2	74.0	73.8	73.6	73.4	73.2	73.0	72.8	72.7
72.5	72.3	72.1	71.9	71.7	71.5	71.3	71.1	70.9	70.7
70.5	70.3	70.1	69.9	69.7	69.5	69.3	69.1	68.9	68.7
68.6									

```
DAY BASE MEAN                                                  4
          9        301     100.00    -199.00     DAY BASE MEAN
     137.60     100.00METER                          100.00       1.00
     125.00    1000.00FEET                           304.80      49.40
     116.70    2000.00FEET                           609.60      79.50
     105.80       1.00MILE                          1609.34     121.66
      94.40       2.00MILE                          3218.69     151.77
      85.10       5.00MILE                          8046.72     191.56
      79.70      10.00MILE                         16093.44     221.66
      75.80      15.00MILE                         24140.16     239.27
      60.60  100000.00METER                       100000.00     301.00
```

```
137.6 137.2 136.9 136.7 136.4 136.2 135.9 135.6 135.4 135.1
134.9 134.6 134.3 134.1 133.8 133.6 133.3 133.0 132.8 132.5
132.3 132.0 131.7 131.5 131.2 131.0 130.7 130.4 130.2 129.9
129.7 129.4 129.1 128.9 128.6 128.4 128.1 127.8 127.6 127.3
127.1 126.8 126.5 126.3 126.0 125.8 125.5 125.2 125.0 124.7
124.4 124.1 123.9 123.6 123.3 123.0 122.8 122.5 122.2 121.9
121.7 121.4 121.1 120.8 120.6 120.3 120.0 119.7 119.5 119.2
118.9 118.6 118.4 118.1 117.8 117.5 117.3 117.0 116.7 116.4
116.2 115.9 115.7 115.4 115.1 114.9 114.6 114.4 114.1 113.9
113.6 113.3 113.1 112.8 112.6 112.3 112.0 111.8 111.5 111.3
111.0 110.8 110.5 110.2 110.0 109.7 109.5 109.2 108.9 108.7
108.4 108.2 107.9 107.7 107.4 107.1 106.9 106.6 106.4 106.1
105.8 105.5 105.1 104.7 104.3 104.0 103.6 103.2 102.8 102.5
102.1 101.7 101.3 100.9 100.6 100.2  99.8  99.4  99.0  98.7
 98.3  97.9  97.5  97.2  96.8  96.4  96.0  95.6  95.3  94.9
 94.5  94.2  94.0  93.8  93.5  93.3  93.1  92.8  92.6  92.4
 92.1  91.9  91.7  91.4  91.2  91.0  90.7  90.5  90.3  90.0
 89.8  89.6  89.3  89.1  88.9  88.6  88.4  88.2  87.9  87.7
 87.5  87.2  87.0  86.8  86.5  86.3  86.0  85.8  85.6  85.3
 85.1  84.9  84.8  84.6  84.4  84.2  84.0  83.9  83.7  83.5
 83.3  83.1  83.0  82.8  82.6  82.4  82.2  82.1  81.9  81.7
 81.5  81.3  81.2  81.0  80.8  80.6  80.4  80.3  80.1  79.9
 79.7  79.5  79.3  79.1  78.9  78.6  78.4  78.2  78.0  77.7
 77.5  77.3  77.1  76.9  76.6  76.4  76.2  76.0  75.7  75.5
 75.3  75.0  74.8  74.5  74.3  74.0  73.8  73.5  73.3  73.0
 72.8  72.5  72.3  72.1  71.8  71.6  71.3  71.1  70.8  70.6
 70.3  70.1  69.8  69.6  69.3  69.1  68.8  68.6  68.4  68.1
 67.9  67.6  67.4  67.1  66.9  66.6  66.4  66.1  65.9  65.6
 65.4  65.2  64.9  64.7  64.4  64.2  63.9  63.7  63.4  63.2
 62.9  62.7  62.4  62.2  62.0  61.7  61.5  61.2  61.0  60.7
 60.6
```

DAY NEG MAX					5	
9	301	100.00	-199.00	DAY NEG MAX		
135.10	100.00METER				100.00	1.00
121.60	1000.00FEET				304.80	49.40
112.60	2000.00FEET				609.60	79.50
101.60	1.00MILE				1609.34	121.66
89.60	2.00MILE				3218.69	151.77
79.00	5.00MILE				8046.72	191.56
73.00	10.00MILE				16093.44	221.66
68.60	15.00MILE				24140.16	239.27
55.60	100000.00METER				100000.00	301.00

135.1	134.7	134.4	134.1	133.8	133.6	133.3	133.0	132.7	132.5
132.2	131.9	131.6	131.3	131.1	130.8	130.5	130.2	129.9	129.7
129.4	129.1	128.8	128.5	128.3	128.0	127.7	127.4	127.2	126.9
126.6	126.3	126.0	125.8	125.5	125.2	124.9	124.6	124.4	124.1
123.8	123.5	123.2	123.0	122.7	122.4	122.1	121.9	121.6	121.3
121.0	120.7	120.4	120.1	119.8	119.5	119.2	118.9	118.6	118.3
118.0	117.7	117.4	117.1	116.8	116.5	116.2	115.9	115.6	115.3
115.0	114.7	114.4	114.1	113.8	113.5	113.2	112.9	112.6	112.3
112.1	111.8	111.6	111.3	111.0	110.8	110.5	110.3	110.0	109.7
109.5	109.2	108.9	108.7	108.4	108.2	107.9	107.6	107.4	107.1
106.9	106.6	106.3	106.1	105.8	105.6	105.3	105.0	104.8	104.5
104.3	104.0	103.7	103.5	103.2	102.9	102.7	102.4	102.2	101.9
101.6	101.3	100.9	100.5	100.1	99.7	99.3	98.9	98.5	98.1
97.7	97.3	96.9	96.5	96.1	95.7	95.3	94.9	94.5	94.1
93.7	93.3	92.9	92.5	92.1	91.7	91.3	90.9	90.5	90.1
89.7	89.4	89.1	88.9	88.6	88.3	88.1	87.8	87.5	87.3
87.0	86.7	86.5	86.2	85.9	85.7	85.4	85.1	84.9	84.6
84.3	84.1	83.8	83.5	83.3	83.0	82.7	82.5	82.2	81.9
81.7	81.4	81.1	80.9	80.6	80.3	80.1	79.8	79.5	79.3
79.0	78.8	78.6	78.4	78.2	78.0	77.8	77.6	77.4	77.2
77.0	76.8	76.6	76.4	76.2	76.0	75.8	75.6	75.4	75.2
75.0	74.8	74.6	74.4	74.2	74.0	73.8	73.6	73.4	73.2
73.0	72.8	72.5	72.3	72.0	71.8	71.5	71.3	71.0	70.8
70.5	70.3	70.0	69.8	69.5	69.3	69.0	68.8	68.6	68.3
68.1	67.9	67.7	67.5	67.3	67.1	66.9	66.7	66.4	66.2
66.0	65.8	65.6	65.4	65.2	65.0	64.8	64.6	64.3	64.1
63.9	63.7	63.5	63.3	63.1	62.9	62.7	62.4	62.2	62.0
61.8	61.6	61.4	61.2	61.0	60.8	60.5	60.3	60.1	59.9
59.7	59.5	59.3	59.1	58.9	58.7	58.4	58.2	58.0	57.8
57.6	57.4	57.2	57.0	56.8	56.5	56.3	56.1	55.9	55.7
55.6									

DAY NEG MEAN

9	301	100.00	-199.00
131.10	100.00METER		
117.20	1000.00FEET		
106.40	2000.00FEET		
97.30	1.00MILE		
85.90	2.00MILE		
73.80	5.00MILE		
69.40	10.00MILE		
65.80	15.00MILE		
52.60	100000.00METER		

DAY NEG MEAN

6	
100.00	1.00
304.80	49.40
609.60	79.50
1609.34	121.66
3218.69	151.77
8046.72	191.56
16093.44	221.66
24140.16	239.27
100000.00	301.00

131.1	130.7	130.4	130.1	129.8	129.5	129.2	128.9	128.7	128.4
128.1	127.8	127.5	127.2	126.9	126.6	126.4	126.1	125.8	125.5
125.2	124.9	124.6	124.4	124.1	123.8	123.5	123.2	122.9	122.6
122.3	122.1	121.8	121.5	121.2	120.9	120.6	120.3	120.0	119.8
119.5	119.2	118.9	118.6	118.3	118.0	117.7	117.5	117.2	116.8
116.4	116.1	115.7	115.4	115.0	114.7	114.3	113.9	113.6	113.2
112.9	112.5	112.1	111.8	111.4	111.1	110.7	110.3	110.0	109.6
109.3	108.9	108.6	108.2	107.8	107.5	107.1	106.8	106.4	106.2
106.0	105.8	105.5	105.3	105.1	104.9	104.7	104.5	104.2	104.0
103.8	103.6	103.4	103.2	102.9	102.7	102.5	102.3	102.1	101.9
101.7	101.4	101.2	101.0	100.8	100.6	100.4	100.1	99.9	99.7
99.5	99.3	99.1	98.8	98.6	98.4	98.2	98.0	97.8	97.6
97.3	97.0	96.6	96.2	95.8	95.5	95.1	94.7	94.3	94.0
93.6	93.2	92.8	92.4	92.1	91.7	91.3	90.9	90.5	90.2
89.8	89.4	89.0	88.7	88.3	87.9	87.5	87.1	86.8	86.4
86.0	85.7	85.4	85.1	84.8	84.5	84.2	83.9	83.5	83.2
82.9	82.6	82.3	82.0	81.7	81.4	81.1	80.8	80.5	80.2
79.9	79.6	79.3	79.0	78.7	78.4	78.1	77.8	77.5	77.2
76.9	76.6	76.3	75.9	75.6	75.3	75.0	74.7	74.4	74.1
73.8	73.7	73.5	73.4	73.2	73.1	72.9	72.8	72.6	72.5
72.3	72.2	72.1	71.9	71.8	71.6	71.5	71.3	71.2	71.0
70.9	70.7	70.6	70.4	70.3	70.2	70.0	69.9	69.7	69.6
69.4	69.2	69.0	68.8	68.6	68.4	68.2	68.0	67.8	67.6
67.4	67.2	67.0	66.8	66.6	66.4	66.2	66.0	65.8	65.5
65.3	65.1	64.9	64.7	64.5	64.3	64.0	63.8	63.6	63.4
63.2	63.0	62.8	62.5	62.3	62.1	61.9	61.7	61.5	61.3
61.0	60.8	60.6	60.4	60.2	60.0	59.8	59.6	59.3	59.1
58.9	58.7	58.5	58.3	58.1	57.8	57.6	57.4	57.2	57.0
56.8	56.6	56.3	56.1	55.9	55.7	55.5	55.3	55.1	54.8
54.6	54.4	54.2	54.0	53.8	53.6	53.3	53.1	52.9	52.7
52.6									

DAY EX NEG MAX 7

9	301	100.00	-199.00	DAY EX NEG MAX	
120.10	100.00METER			100.00	1.00
107.60	1000.00FEET			304.80	49.40
99.60	2000.00FEET			609.60	79.50
90.60	1.00MILE			1609.34	121.66
81.20	2.00MILE			3218.69	151.77
64.70	5.00MILE			8046.72	191.56
59.60	10.00MILE			16093.44	221.66
57.00	15.00MILE			24140.16	239.27
46.60	100000.00METER			100000.00	301.00

120.1	119.7	119.5	119.2	118.9	118.7	118.4	118.2	117.9	117.6
117.4	117.1	116.9	116.6	116.4	116.1	115.8	115.6	115.3	115.1
114.8	114.5	114.3	114.0	113.8	113.5	113.3	113.0	112.7	112.5
112.2	112.0	111.7	111.4	111.2	110.9	110.7	110.4	110.2	109.9
109.6	109.4	109.1	108.9	108.6	108.3	108.1	107.8	107.6	107.3
107.0	106.8	106.5	106.2	106.0	105.7	105.4	105.2	104.9	104.7
104.4	104.1	103.9	103.6	103.3	103.1	102.8	102.5	102.3	102.0
101.7	101.5	101.2	100.9	100.7	100.4	100.1	99.9	99.6	99.4
99.2	99.0	98.7	98.5	98.3	98.1	97.9	97.7	97.5	97.3
97.0	96.8	96.6	96.4	96.2	96.0	95.8	95.5	95.3	95.1
94.9	94.7	94.5	94.3	94.1	93.8	93.6	93.4	93.2	93.0
92.8	92.6	92.3	92.1	91.9	91.7	91.5	91.3	91.1	90.8
90.6	90.3	90.0	89.7	89.4	89.1	88.8	88.5	88.2	87.8
87.5	87.2	86.9	86.6	86.3	86.0	85.7	85.3	85.0	84.7
84.4	84.1	83.8	83.5	83.2	82.8	82.5	82.2	81.9	81.6
81.3	80.9	80.5	80.1	79.7	79.2	78.8	78.4	78.0	77.6
77.2	76.8	76.3	75.9	75.5	75.1	74.7	74.3	73.8	73.4
73.0	72.6	72.2	71.8	71.4	70.9	70.5	70.1	69.7	69.3
68.9	68.5	68.0	67.6	67.2	66.8	66.4	66.0	65.6	65.1
64.7	64.5	64.4	64.2	64.0	63.9	63.7	63.5	63.4	63.2
63.0	62.8	62.7	62.5	62.3	62.2	62.0	61.8	61.7	61.5
61.3	61.2	61.0	60.8	60.6	60.5	60.3	60.1	60.0	59.8
59.6	59.5	59.3	59.2	59.0	58.9	58.7	58.6	58.4	58.3
58.1	58.0	57.9	57.7	57.6	57.4	57.3	57.1	57.0	56.8
56.6	56.5	56.3	56.1	56.0	55.8	55.6	55.4	55.3	55.1
54.9	54.8	54.6	54.4	54.3	54.1	53.9	53.8	53.6	53.4
53.3	53.1	52.9	52.7	52.6	52.4	52.2	52.1	51.9	51.7
51.6	51.4	51.2	51.1	50.9	50.7	50.6	50.4	50.2	50.1
49.9	49.7	49.5	49.4	49.2	49.0	48.9	48.7	48.5	48.4
48.2	48.0	47.9	47.7	47.5	47.4	47.2	47.0	46.9	46.7
46.6									

DAY EX NEG MEAN 8

9 301 100.00 -199.00 DAY EX NEG MEAN

118.10	100.00METER	100.00	1.00
106.10	1000.00FEET	304.80	49.40
97.00	2000.00FEET	609.60	79.50
86.90	1.00MILE	1609.34	121.66
77.10	2.00MILE	3218.69	151.77
60.50	5.00MILE	8046.72	191.56
54.60	10.00MILE	16093.44	221.66
49.10	15.00MILE	24140.16	239.27
39.10	100000.00METER	100000.00	301.00

118.1	117.7	117.5	117.2	117.0	116.7	116.5	116.2	116.0	115.7
115.5	115.2	115.0	114.8	114.5	114.3	114.0	113.8	113.5	113.3
113.0	112.8	112.5	112.3	112.0	111.8	111.5	111.3	111.0	110.8
110.5	110.3	110.0	109.8	109.5	109.3	109.1	108.8	108.6	108.3
108.1	107.8	107.6	107.3	107.1	106.8	106.6	106.3	106.1	105.8
105.5	105.2	104.9	104.6	104.3	104.0	103.7	103.3	103.0	102.7
102.4	102.1	101.8	101.5	101.2	100.9	100.6	100.3	100.0	99.7
99.4	99.1	98.8	98.5	98.2	97.9	97.6	97.3	97.0	96.8
96.5	96.3	96.0	95.8	95.6	95.3	95.1	94.8	94.6	94.4
94.1	93.9	93.6	93.4	93.2	92.9	92.7	92.4	92.2	92.0
91.7	91.5	91.3	91.0	90.8	90.5	90.3	90.1	89.8	89.6
89.3	89.1	88.9	88.6	88.4	88.1	87.9	87.7	87.4	87.2
86.9	86.6	86.3	86.0	85.7	85.3	85.0	84.7	84.3	84.0
83.7	83.4	83.0	82.7	82.4	82.1	81.7	81.4	81.1	80.8
80.4	80.1	79.8	79.5	79.1	78.8	78.5	78.2	77.8	77.5
77.2	76.8	76.4	76.0	75.5	75.1	74.7	74.3	73.9	73.5
73.0	72.6	72.2	71.8	71.4	71.0	70.5	70.1	69.7	69.3
68.9	68.5	68.0	67.6	67.2	66.8	66.4	65.9	65.5	65.1
64.7	64.3	63.9	63.4	63.0	62.6	62.2	61.8	61.4	60.9
60.5	60.3	60.1	59.9	59.7	59.5	59.3	59.1	58.9	58.7
58.6	58.4	58.2	58.0	57.8	57.6	57.4	57.2	57.0	56.8
56.6	56.4	56.2	56.0	55.8	55.6	55.4	55.2	55.0	54.8
54.6	54.3	54.0	53.7	53.4	53.1	52.8	52.5	52.2	51.8
51.5	51.2	50.9	50.6	50.3	50.0	49.7	49.3	49.1	48.9
48.7	48.6	48.4	48.3	48.1	47.9	47.8	47.6	47.4	47.3
47.1	47.0	46.8	46.6	46.5	46.3	46.1	46.0	45.8	45.7
45.5	45.3	45.2	45.0	44.9	44.7	44.5	44.4	44.2	44.0
43.9	43.7	43.6	43.4	43.2	43.1	42.9	42.7	42.6	42.4
42.3	42.1	41.9	41.8	41.6	41.4	41.3	41.1	41.0	40.8
40.6	40.5	40.3	40.2	40.0	39.8	39.7	39.5	39.3	39.2
39.1									

DAY EX NEG MIN

9	301	100.00	-199.00
111.10	100.00METER		
97.10	1000.00FEET		
88.10	2000.00FEET		
78.60	1.00MILE		
68.10	2.00MILE		
50.60	5.00MILE		
44.10	10.00MILE		
38.10	15.00MILE		
27.10	100000.00METER		

DAY EX NEG MIN

9	
100.00	1.00
304.80	49.40
609.60	79.50
1609.34	121.66
3218.69	151.77
8046.72	191.56
16093.44	221.66
24140.16	239.27
100000.00	301.00

111.1	110.7	110.4	110.1	109.8	109.5	109.2	108.9	108.6	108.4
108.1	107.8	107.5	107.2	106.9	106.6	106.3	106.0	105.7	105.5
105.2	104.9	104.6	104.3	104.0	103.7	103.4	103.1	102.9	102.6
102.3	102.0	101.7	101.4	101.1	100.8	100.5	100.3	100.0	99.7
99.4	99.1	98.8	98.5	98.2	97.9	97.7	97.4	97.1	96.8
96.5	96.2	95.9	95.6	95.3	95.0	94.7	94.4	94.1	93.8
93.5	93.2	92.9	92.6	92.3	92.0	91.7	91.4	91.1	90.8
90.5	90.2	89.9	89.6	89.3	89.0	88.7	88.4	88.1	87.9
87.7	87.4	87.2	87.0	86.7	86.5	86.3	86.1	85.8	85.6
85.4	85.2	84.9	84.7	84.5	84.3	84.0	83.8	83.6	83.4
83.1	82.9	82.7	82.5	82.2	82.0	81.8	81.6	81.3	81.1
80.9	80.7	80.4	80.2	80.0	79.8	79.5	79.3	79.1	78.9
78.6	78.3	78.0	77.6	77.3	76.9	76.6	76.2	75.9	75.5
75.2	74.8	74.5	74.1	73.8	73.4	73.1	72.7	72.4	72.0
71.7	71.3	71.0	70.6	70.3	69.9	69.6	69.2	68.9	68.5
68.2	67.8	67.3	66.9	66.5	66.0	65.6	65.1	64.7	64.3
63.8	63.4	62.9	62.5	62.1	61.6	61.2	60.7	60.3	59.9
59.4	59.0	58.5	58.1	57.7	57.2	56.8	56.3	55.9	55.5
55.0	54.6	54.1	53.7	53.3	52.8	52.4	51.9	51.5	51.1
50.6	50.4	50.2	50.0	49.7	49.5	49.3	49.1	48.9	48.7
48.5	48.2	48.0	47.8	47.6	47.4	47.2	46.9	46.7	46.5
46.3	46.1	45.9	45.6	45.4	45.2	45.0	44.8	44.6	44.4
44.1	43.8	43.5	43.1	42.8	42.5	42.1	41.8	41.4	41.1
40.7	40.4	40.1	39.7	39.4	39.0	38.7	38.4	38.1	37.9
37.7	37.5	37.3	37.2	37.0	36.8	36.6	36.5	36.3	36.1
35.9	35.7	35.6	35.4	35.2	35.0	34.9	34.7	34.5	34.3
34.1	34.0	33.8	33.6	33.4	33.2	33.1	32.9	32.7	32.5
32.4	32.2	32.0	31.8	31.6	31.5	31.3	31.1	30.9	30.8
30.6	30.4	30.2	30.0	29.9	29.7	29.5	29.3	29.1	29.0
28.8	28.6	28.4	28.3	28.1	27.9	27.7	27.5	27.4	27.2
27.1									

NIGHT FOCUS MAX 10

9 301 100.00 -199.00 NIGHT FOCUS MAX

140.90	100.00METER	100.00	1.00
132.10	1000.00FEET	304.80	49.40
127.10	2000.00FEET	609.60	79.50
115.90	1.00MILE	1609.34	121.66
106.40	2.00MILE	3218.69	151.77
96.70	5.00MILE	8046.72	191.56
93.00	10.00MILE	16093.44	221.66
91.60	15.00MILE	24140.16	239.27
86.60	100000.00METER	100000.00	301.00

140.9	140.6	140.4	140.3	140.1	139.9	139.7	139.5	139.4	139.2
139.0	138.8	138.6	138.4	138.3	138.1	137.9	137.7	137.5	137.4
137.2	137.0	136.8	136.6	136.4	136.3	136.1	135.9	135.7	135.5
135.4	135.2	135.0	134.8	134.6	134.4	134.3	134.1	133.9	133.7
133.5	133.4	133.2	133.0	132.8	132.6	132.4	132.3	132.1	131.9
131.8	131.6	131.4	131.3	131.1	130.9	130.8	130.6	130.4	130.3
130.1	129.9	129.8	129.6	129.4	129.3	129.1	128.9	128.8	128.6
128.4	128.3	128.1	127.9	127.8	127.6	127.4	127.3	127.1	126.8
126.6	126.3	126.0	125.8	125.5	125.2	125.0	124.7	124.4	124.2
123.9	123.6	123.4	123.1	122.9	122.6	122.3	122.1	121.8	121.5
121.3	121.0	120.7	120.5	120.2	119.9	119.7	119.4	119.1	118.9
118.6	118.3	118.1	117.8	117.5	117.3	117.0	116.7	116.5	116.2
115.9	115.6	115.3	115.0	114.7	114.4	114.1	113.7	113.4	113.1
112.8	112.5	112.2	111.8	111.5	111.2	110.9	110.6	110.3	110.0
109.6	109.3	109.0	108.7	108.4	108.1	107.7	107.4	107.1	106.8
106.5	106.2	106.0	105.7	105.5	105.2	105.0	104.8	104.5	104.3
104.0	103.8	103.5	103.3	103.1	102.8	102.6	102.3	102.1	101.8
101.6	101.3	101.1	100.9	100.6	100.4	100.1	99.9	99.6	99.4
99.2	98.9	98.7	98.4	98.2	97.9	97.7	97.4	97.2	97.0
96.7	96.6	96.5	96.3	96.2	96.1	96.0	95.8	95.7	95.6
95.5	95.4	95.2	95.1	95.0	94.9	94.7	94.6	94.5	94.4
94.2	94.1	94.0	93.9	93.8	93.6	93.5	93.4	93.3	93.1
93.0	92.9	92.9	92.8	92.7	92.6	92.5	92.5	92.4	92.3
92.2	92.1	92.1	92.0	91.9	91.8	91.7	91.7	91.6	91.5
91.4	91.3	91.3	91.2	91.1	91.0	90.9	90.9	90.8	90.7
90.6	90.5	90.4	90.4	90.3	90.2	90.1	90.0	90.0	89.9
89.8	89.7	89.6	89.6	89.5	89.4	89.3	89.2	89.2	89.1
89.0	88.9	88.8	88.7	88.7	88.6	88.5	88.4	88.3	88.3
88.2	88.1	88.0	87.9	87.9	87.8	87.7	87.6	87.5	87.5
87.4	87.3	87.2	87.1	87.0	87.0	86.9	86.8	86.7	86.6
86.6									

NIGHT FOCUS MEAN

9	301	100.00	-199.00	11 NIGHT FOCUS MEAN	
139.30	100.00METER			100.00	1.00
130.40	1000.00FEET			304.80	49.40
124.30	2000.00FEET			609.60	79.50
110.90	1.00MILE			1609.34	121.66
101.40	2.00MILE			3218.69	151.77
91.70	5.00MILE			8046.72	191.56
88.00	10.00MILE			16093.44	221.66
86.60	15.00MILE			24140.16	239.27
82.10	100000.00METER			100000.00	301.00

139.3	139.0	138.8	138.7	138.5	138.3	138.1	137.9	137.7	137.6
137.4	137.2	137.0	136.8	136.6	136.4	136.3	136.1	135.9	135.7
135.5	135.3	135.2	135.0	134.8	134.6	134.4	134.2	134.1	133.9
133.7	133.5	133.3	133.1	133.0	132.8	132.6	132.4	132.2	132.0
131.9	131.7	131.5	131.3	131.1	130.9	130.7	130.6	130.4	130.2
130.0	129.8	129.6	129.4	129.2	129.0	128.8	128.6	128.4	128.2
127.9	127.7	127.5	127.3	127.1	126.9	126.7	126.5	126.3	126.1
125.9	125.7	125.5	125.3	125.1	124.9	124.7	124.5	124.3	124.0
123.7	123.3	123.0	122.7	122.4	122.1	121.8	121.4	121.1	120.8
120.5	120.2	119.9	119.5	119.2	118.9	118.6	118.3	117.9	117.6
117.3	117.0	116.7	116.4	116.0	115.7	115.4	115.1	114.8	114.4
114.1	113.8	113.5	113.2	112.9	112.5	112.2	111.9	111.6	111.3
111.0	110.6	110.3	110.0	109.7	109.4	109.1	108.7	108.4	108.1
107.8	107.5	107.2	106.8	106.5	106.2	105.9	105.6	105.3	105.0
104.6	104.3	104.0	103.7	103.4	103.1	102.7	102.4	102.1	101.8
101.5	101.2	101.0	100.7	100.5	100.2	100.0	99.8	99.5	99.3
99.0	98.8	98.5	98.3	98.1	97.8	97.6	97.3	97.1	96.8
96.6	96.3	96.1	95.9	95.6	95.4	95.1	94.9	94.6	94.4
94.2	93.9	93.7	93.4	93.2	92.9	92.7	92.4	92.2	92.0
91.7	91.6	91.5	91.3	91.2	91.1	91.0	90.8	90.7	90.6
90.5	90.4	90.2	90.1	90.0	89.9	89.7	89.6	89.5	89.4
89.2	89.1	89.0	88.9	88.8	88.6	88.5	88.4	88.3	88.1
88.0	87.9	87.9	87.8	87.7	87.6	87.5	87.5	87.4	87.3
87.2	87.1	87.1	87.0	86.9	86.8	86.7	86.7	86.6	86.5
86.4	86.4	86.3	86.2	86.1	86.1	86.0	85.9	85.9	85.8
85.7	85.6	85.6	85.5	85.4	85.3	85.3	85.2	85.1	85.1
85.0	84.9	84.8	84.8	84.7	84.6	84.5	84.5	84.4	84.3
84.3	84.2	84.1	84.0	84.0	83.9	83.8	83.7	83.7	83.6
83.5	83.4	83.4	83.3	83.2	83.2	83.1	83.0	82.9	82.9
82.8	82.7	82.6	82.6	82.5	82.4	82.4	82.3	82.2	82.1
82.1									

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NIGHT BASE MAX                                                  12
         9        301     100.00    -199.00     NIGHT BASE MAX
     138.10     100.00METER                          100.00      1.00
     128.60    1000.00FEET                           304.80     49.40
     122.60    2000.00FEET                           609.60     79.50
     109.60       1.00MILE                          1609.34    121.66
      99.60       2.00MILE                          3218.69    151.77
      89.20       5.00MILE                          8046.72    191.56
      83.50      10.00MILE                         16093.44    221.66
      79.90      15.00MILE                         24140.16    239.27
      68.10  100000.00METER                        100000.00    301.00
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138.1 137.8 137.6 137.4 137.2 137.0 136.8 136.6 136.4 136.2
136.0 135.8 135.6 135.5 135.3 135.1 134.9 134.7 134.5 134.3
134.1 133.9 133.7 133.5 133.3 133.1 132.9 132.7 132.5 132.3
132.1 131.9 131.7 131.5 131.3 131.1 130.9 130.7 130.5 130.3
130.2 130.0 129.8 129.6 129.4 129.2 129.0 128.8 128.6 128.4
128.2 128.0 127.8 127.6 127.4 127.2 127.0 126.8 126.6 126.4
126.2 126.0 125.8 125.6 125.4 125.2 125.0 124.8 124.6 124.4
124.2 124.0 123.8 123.6 123.4 123.2 123.0 122.8 122.6 122.3
122.0 121.7 121.4 121.1 120.8 120.4 120.1 119.8 119.5 119.2
118.9 118.6 118.3 118.0 117.7 117.4 117.1 116.7 116.4 116.1
115.8 115.5 115.2 114.9 114.6 114.3 114.0 113.7 113.4 113.0
112.7 112.4 112.1 111.8 111.5 111.2 110.9 110.6 110.3 110.0
109.7 109.3 109.0 108.7 108.3 108.0 107.7 107.3 107.0 106.7
106.3 106.0 105.7 105.3 105.0 104.7 104.3 104.0 103.7 103.3
103.0 102.7 102.3 102.0 101.7 101.3 101.0 100.7 100.4 100.0
 99.7  99.4  99.1  98.9  98.6  98.4  98.1  97.8  97.6  97.3
 97.1  96.8  96.5  96.3  96.0  95.7  95.5  95.2  95.0  94.7
 94.4  94.2  93.9  93.7  93.4  93.1  92.9  92.6  92.4  92.1
 91.8  91.6  91.3  91.0  90.8  90.5  90.3  90.0  89.7  89.5
 89.2  89.0  88.8  88.6  88.5  88.3  88.1  87.9  87.7  87.5
 87.3  87.1  86.9  86.8  86.6  86.4  86.2  86.0  85.8  85.6
 85.4  85.2  85.0  84.9  84.7  84.5  84.3  84.1  83.9  83.7
 83.5  83.3  83.1  82.9  82.7  82.5  82.3  82.1  81.9  81.7
 81.5  81.3  81.1  80.9  80.7  80.5  80.3  80.1  79.9  79.7
 79.5  79.3  79.1  78.9  78.7  78.5  78.3  78.1  77.9  77.8
 77.6  77.4  77.2  77.0  76.8  76.6  76.4  76.2  76.0  75.8
 75.7  75.5  75.3  75.1  74.9  74.7  74.5  74.3  74.1  73.9
 73.7  73.5  73.4  73.2  73.0  72.8  72.6  72.4  72.2  72.0
 71.8  71.6  71.4  71.3  71.1  70.9  70.7  70.5  70.3  70.1
 69.9  69.7  69.5  69.3  69.2  69.0  68.8  68.6  68.4  68.2
 68.1
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NIGHT BASE MEAN					13	
9	301	100.00	-199.00	NIGHT BASE MEAN		
135.10	100.00METER				100.00	1.00
124.30	1000.00FEET				304.80	49.40
117.20	2000.00FEET				609.60	79.50
104.60	1.00MILE				1609.34	121.66
95.30	2.00MILE				3218.69	151.77
84.70	5.00MILE				8046.72	191.56
78.80	10.00MILE				16093.44	221.66
76.10	15.00MILE				24140.16	239.27
65.10	100000.00METER				100000.00	301.00

135.1	134.8	134.5	134.3	134.1	133.9	133.6	133.4	133.2	133.0
132.8	132.5	132.3	132.1	131.9	131.6	131.4	131.2	131.0	130.7
130.5	130.3	130.1	129.9	129.6	129.4	129.2	129.0	128.7	128.5
128.3	128.1	127.8	127.6	127.4	127.2	127.0	126.7	126.5	126.3
126.1	125.8	125.6	125.4	125.2	124.9	124.7	124.5	124.3	124.0
123.8	123.6	123.3	123.1	122.9	122.6	122.4	122.2	121.9	121.7
121.4	121.2	121.0	120.7	120.5	120.3	120.0	119.8	119.6	119.3
119.1	118.9	118.6	118.4	118.1	117.9	117.7	117.4	117.2	116.9
116.6	116.3	116.0	115.7	115.4	115.1	114.8	114.5	114.2	113.9
113.6	113.3	113.0	112.7	112.4	112.1	111.8	111.5	111.2	110.9
110.6	110.3	110.0	109.7	109.4	109.1	108.8	108.5	108.2	107.9
107.6	107.3	107.0	106.7	106.4	106.1	105.8	105.5	105.2	104.9
104.6	104.3	104.0	103.7	103.4	103.1	102.8	102.5	102.2	101.9
101.6	101.3	100.9	100.6	100.3	100.0	99.7	99.4	99.1	98.8
98.5	98.2	97.9	97.5	97.2	96.9	96.6	96.3	96.0	95.7
95.4	95.1	94.8	94.6	94.3	94.0	93.8	93.5	93.2	93.0
92.7	92.4	92.2	91.9	91.6	91.4	91.1	90.8	90.6	90.3
90.0	89.8	89.5	89.2	89.0	88.7	88.4	88.2	87.9	87.6
87.4	87.1	86.8	86.6	86.3	86.0	85.8	85.5	85.2	85.0
84.7	84.5	84.3	84.1	83.9	83.7	83.5	83.3	83.1	82.9
82.8	82.6	82.4	82.2	82.0	81.8	81.6	81.4	81.2	81.0
80.8	80.6	80.4	80.2	80.0	79.8	79.6	79.4	79.2	79.0
78.8	78.7	78.5	78.4	78.2	78.1	77.9	77.8	77.6	77.4
77.3	77.1	77.0	76.8	76.7	76.5	76.4	76.2	76.1	75.9
75.7	75.5	75.3	75.2	75.0	74.8	74.6	74.5	74.3	74.1
73.9	73.7	73.6	73.4	73.2	73.0	72.9	72.7	72.5	72.3
72.1	72.0	71.8	71.6	71.4	71.2	71.1	70.9	70.7	70.5
70.4	70.2	70.0	69.8	69.6	69.5	69.3	69.1	68.9	68.8
68.6	68.4	68.2	68.0	67.9	67.7	67.5	67.3	67.1	67.0
66.8	66.6	66.4	66.3	66.1	65.9	65.7	65.5	65.4	65.2
65.1									

NIGHT NEG MAX 14

9	301	100.00	-199.00	NIGHT NEG MAX	
133.60	100.00METER			100.00	1.00
121.60	1000.00FEET			304.80	49.40
111.60	2000.00FEET			609.60	79.50
98.60	1.00MILE			1609.34	121.66
90.80	2.00MILE			3218.69	151.77
77.40	5.00MILE			8046.72	191.56
72.70	10.00MILE			16093.44	221.66
67.40	15.00MILE			24140.16	239.27
52.60	100000.00METER			100000.00	301.00

133.6	133.2	133.0	132.7	132.5	132.2	132.0	131.7	131.5	131.2
131.0	130.7	130.5	130.3	130.0	129.8	129.5	129.3	129.0	128.8
128.5	128.3	128.0	127.8	127.5	127.3	127.0	126.8	126.5	126.3
126.0	125.8	125.5	125.3	125.0	124.8	124.6	124.3	124.1	123.8
123.6	123.3	123.1	122.8	122.6	122.3	122.1	121.8	121.6	121.2
120.9	120.6	120.2	119.9	119.6	119.2	118.9	118.6	118.2	117.9
117.6	117.2	116.9	116.6	116.3	115.9	115.6	115.3	114.9	114.6
114.3	113.9	113.6	113.3	112.9	112.6	112.3	111.9	111.6	111.3
111.0	110.7	110.4	110.1	109.8	109.4	109.1	108.8	108.5	108.2
107.9	107.6	107.3	107.0	106.7	106.4	106.1	105.7	105.4	105.1
104.8	104.5	104.2	103.9	103.6	103.3	103.0	102.7	102.4	102.0
101.7	101.4	101.1	100.8	100.5	100.2	99.9	99.6	99.3	99.0
98.7	98.4	98.1	97.9	97.6	97.3	97.1	96.8	96.6	96.3
96.1	95.8	95.5	95.3	95.0	94.8	94.5	94.2	94.0	93.7
93.5	93.2	92.9	92.7	92.4	92.2	91.9	91.6	91.4	91.1
90.9	90.6	90.2	89.9	89.5	89.2	88.9	88.5	88.2	87.9
87.5	87.2	86.8	86.5	86.2	85.8	85.5	85.2	84.8	84.5
84.2	83.8	83.5	83.1	82.8	82.5	82.1	81.8	81.5	81.1
80.8	80.5	80.1	79.8	79.4	79.1	78.8	78.4	78.1	77.8
77.4	77.3	77.1	76.9	76.8	76.6	76.5	76.3	76.2	76.0
75.8	75.7	75.5	75.4	75.2	75.1	74.9	74.8	74.6	74.4
74.3	74.1	74.0	73.8	73.7	73.5	73.4	73.2	73.0	72.9
72.7	72.4	72.1	71.8	71.5	71.2	70.9	70.6	70.3	70.0
69.7	69.4	69.1	68.8	68.5	68.2	67.9	67.6	67.3	67.1
66.9	66.6	66.4	66.1	65.9	65.7	65.4	65.2	64.9	64.7
64.5	64.2	64.0	63.7	63.5	63.3	63.0	62.8	62.6	62.3
62.1	61.8	61.6	61.4	61.1	60.9	60.6	60.4	60.2	59.9
59.7	59.4	59.2	59.0	58.7	58.5	58.2	58.0	57.8	57.5
57.3	57.0	56.8	56.6	56.3	56.1	55.8	55.6	55.4	55.1
54.9	54.6	54.4	54.2	53.9	53.7	53.4	53.2	53.0	52.7
52.6									

NIGHT NEG MEAN 15

9 301 100.00 -199.00 NIGHT NEG MEAN

132.10	100.00METER	100.00	1.00
118.40	1000.00FEET	304.80	49.40
107.30	2000.00FEET	609.60	79.50
93.90	1.00MILE	1609.34	121.66
86.90	2.00MILE	3218.69	151.77
73.40	5.00MILE	8046.72	191.56
68.40	10.00MILE	16093.44	221.66
64.90	15.00MILE	24140.16	239.27
51.60	100000.00METER	100000.00	301.00

132.1	131.7	131.4	131.1	130.8	130.5	130.3	130.0	129.7	129.4
129.1	128.8	128.6	128.3	128.0	127.7	127.4	127.1	126.9	126.6
126.3	126.0	125.7	125.4	125.2	124.9	124.6	124.3	124.0	123.8
123.5	123.2	122.9	122.6	122.3	122.1	121.8	121.5	121.2	120.9
120.6	120.4	120.1	119.8	119.5	119.2	118.9	118.7	118.4	118.0
117.6	117.3	116.9	116.5	116.2	115.8	115.4	115.0	114.7	114.3
113.9	113.6	113.2	112.8	112.5	112.1	111.7	111.4	111.0	110.6
110.3	109.9	109.5	109.1	108.8	108.4	108.0	107.7	107.3	107.0
106.7	106.3	106.0	105.7	105.4	105.1	104.8	104.4	104.1	103.8
103.5	103.2	102.9	102.5	102.2	101.9	101.6	101.3	100.9	100.6
100.3	100.0	99.7	99.4	99.0	98.7	98.4	98.1	97.8	97.4
97.1	96.8	96.5	96.2	95.9	95.5	95.2	94.9	94.6	94.3
94.0	93.7	93.5	93.2	93.0	92.8	92.5	92.3	92.1	91.8
91.6	91.4	91.1	90.9	90.7	90.5	90.2	90.0	89.8	89.5
89.3	89.1	88.8	88.6	88.4	88.1	87.9	87.7	87.4	87.2
87.0	86.7	86.3	86.0	85.6	85.3	85.0	84.6	84.3	83.9
83.6	83.3	82.9	82.6	82.2	81.9	81.6	81.2	80.9	80.5
80.2	79.9	79.5	79.2	78.8	78.5	78.2	77.8	77.5	77.2
76.8	76.5	76.1	75.8	75.5	75.1	74.8	74.4	74.1	73.8
73.4	73.2	73.1	72.9	72.7	72.6	72.4	72.2	72.1	71.9
71.7	71.6	71.4	71.3	71.1	70.9	70.8	70.6	70.4	70.3
70.1	69.9	69.8	69.6	69.4	69.3	69.1	68.9	68.8	68.6
68.4	68.2	68.0	67.8	67.6	67.4	67.2	67.0	66.8	66.6
66.4	66.2	66.0	65.8	65.7	65.5	65.3	65.1	64.9	64.6
64.4	64.2	64.0	63.8	63.6	63.3	63.1	62.9	62.7	62.5
62.3	62.1	61.8	61.6	61.4	61.2	61.0	60.8	60.5	60.3
60.1	59.9	59.7	59.5	59.2	59.0	58.8	58.6	58.4	58.2
58.0	57.7	57.5	57.3	57.1	56.9	56.7	56.4	56.2	56.0
55.8	55.6	55.4	55.2	54.9	54.7	54.5	54.3	54.1	53.9
53.6	53.4	53.2	53.0	52.8	52.6	52.4	52.1	51.9	51.7
51.6									

```
NIGHT EX NEG MAX                                                    16
         9        301     100.00    -199.00     NIGHT EX NEG MAX
    122.50     100.00METER                            100.00      1.00
    108.60    1000.00FEET                             304.80     49.40
     99.60    2000.00FEET                             609.60     79.50
     86.60       1.00MILE                            1609.34    121.66
     78.50       2.00MILE                            3218.69    151.77
     65.40       5.00MILE                            8046.72    191.56
     62.00      10.00MILE                           16093.44    221.66
     58.40      15.00MILE                           24140.16    239.27
     45.10  100000.00METER                          100000.00    301.00
```

```
122.5 122.1 121.8 121.5 121.2 120.9 120.6 120.3 120.1 119.8
119.5 119.2 118.9 118.6 118.3 118.0 117.8 117.5 117.2 116.9
116.6 116.3 116.0 115.8 115.5 115.2 114.9 114.6 114.3 114.0
113.7 113.5 113.2 112.9 112.6 112.3 112.0 111.7 111.4 111.2
110.9 110.6 110.3 110.0 109.7 109.4 109.1 108.9 108.6 108.3
108.0 107.7 107.4 107.1 106.8 106.5 106.2 105.9 105.6 105.3
105.0 104.7 104.4 104.1 103.8 103.5 103.2 102.9 102.6 102.3
102.0 101.7 101.4 101.1 100.8 100.5 100.2  99.9  99.6  99.3
 99.0  98.7  98.4  98.1  97.8  97.4  97.1  96.8  96.5  96.2
 95.9  95.6  95.3  95.0  94.7  94.4  94.1  93.7  93.4  93.1
 92.8  92.5  92.2  91.9  91.6  91.3  91.0  90.7  90.4  90.0
 89.7  89.4  89.1  88.8  88.5  88.2  87.9  87.6  87.3  87.0
 86.7  86.4  86.1  85.8  85.6  85.3  85.0  84.8  84.5  84.2
 84.0  83.7  83.4  83.1  82.9  82.6  82.3  82.1  81.8  81.5
 81.3  81.0  80.7  80.5  80.2  79.9  79.6  79.4  79.1  78.8
 78.6  78.3  77.9  77.6  77.3  76.9  76.6  76.3  76.0  75.6
 75.3  75.0  74.6  74.3  74.0  73.7  73.3  73.0  72.7  72.3
 72.0  71.7  71.3  71.0  70.7  70.4  70.0  69.7  69.4  69.0
 68.7  68.4  68.1  67.7  67.4  67.1  66.7  66.4  66.1  65.7
 65.4  65.3  65.2  65.1  65.0  64.8  64.7  64.6  64.5  64.4
 64.3  64.2  64.1  63.9  63.8  63.7  63.6  63.5  63.4  63.3
 63.1  63.0  62.9  62.8  62.7  62.6  62.5  62.4  62.2  62.1
 62.0  61.8  61.6  61.4  61.2  61.0  60.8  60.6  60.4  60.2
 60.0  59.8  59.6  59.4  59.2  59.0  58.8  58.6  58.4  58.1
 57.9  57.7  57.5  57.3  57.1  56.8  56.6  56.4  56.2  56.0
 55.8  55.6  55.3  55.1  54.9  54.7  54.5  54.3  54.0  53.8
 53.6  53.4  53.2  53.0  52.7  52.5  52.3  52.1  51.9  51.7
 51.5  51.2  51.0  50.8  50.6  50.4  50.2  49.9  49.7  49.5
 49.3  49.1  48.9  48.7  48.4  48.2  48.0  47.8  47.6  47.4
 47.1  46.9  46.7  46.5  46.3  46.1  45.9  45.6  45.4  45.2
 45.1
```

NIGHT EX NEG MEAN

9	301	100.00	-199.00
121.30	100.00METER		
106.50	1000.00FEET		
97.60	2000.00FEET		
82.60	1.00MILE		
73.20	2.00MILE		
60.50	5.00MILE		
55.10	10.00MILE		
51.60	15.00MILE		
39.60	100000.00METER		

NIGHT EX NEG MEAN

17	
100.00	1.00
304.80	49.40
609.60	79.50
1609.34	121.66
3218.69	151.77
8046.72	191.56
16093.44	221.66
24140.16	239.27
100000.00	301.00

121.3	120.8	120.5	120.2	119.9	119.6	119.3	119.0	118.7	118.4
118.1	117.8	117.5	117.2	116.9	116.6	116.3	115.9	115.6	115.3
115.0	114.7	114.4	114.1	113.8	113.5	113.2	112.9	112.6	112.3
112.0	111.7	111.4	111.1	110.8	110.4	110.1	109.8	109.5	109.2
108.9	108.6	108.3	108.0	107.7	107.4	107.1	106.8	106.5	106.2
105.9	105.6	105.3	105.0	104.7	104.4	104.1	103.8	103.5	103.2
102.9	102.6	102.3	102.0	101.7	101.4	101.1	100.9	100.6	100.3
100.0	99.7	99.4	99.1	98.8	98.5	98.2	97.9	97.6	97.2
96.9	96.5	96.2	95.8	95.5	95.1	94.8	94.4	94.0	93.7
93.3	93.0	92.6	92.3	91.9	91.6	91.2	90.8	90.5	90.1
89.8	89.4	89.1	88.7	88.4	88.0	87.6	87.3	86.9	86.6
86.2	85.9	85.5	85.1	84.8	84.4	84.1	83.7	83.4	83.0
82.7	82.3	82.0	81.7	81.4	81.1	80.8	80.5	80.2	79.8
79.5	79.2	78.9	78.6	78.3	78.0	77.7	77.3	77.0	76.7
76.4	76.1	75.8	75.5	75.2	74.8	74.5	74.2	73.9	73.6
73.3	73.0	72.6	72.3	72.0	71.7	71.4	71.1	70.7	70.4
70.1	69.8	69.5	69.1	68.8	68.5	68.2	67.9	67.5	67.2
66.9	66.6	66.3	65.9	65.6	65.3	65.0	64.7	64.3	64.0
63.7	63.4	63.1	62.8	62.4	62.1	61.8	61.5	61.2	60.8
60.5	60.3	60.2	60.0	59.8	59.6	59.4	59.3	59.1	58.9
58.7	58.5	58.4	58.2	58.0	57.8	57.6	57.5	57.3	57.1
56.9	56.7	56.6	56.4	56.2	56.0	55.8	55.7	55.5	55.3
55.1	54.9	54.7	54.5	54.3	54.1	53.9	53.7	53.5	53.3
53.1	52.9	52.7	52.5	52.4	52.2	52.0	51.8	51.6	51.4
51.2	51.0	50.8	50.6	50.4	50.2	50.0	49.8	49.6	49.4
49.2	49.0	48.8	48.6	48.4	48.3	48.1	47.9	47.7	47.5
47.3	47.1	46.9	46.7	46.5	46.3	46.1	45.9	45.7	45.5
45.3	45.1	44.9	44.8	44.6	44.4	44.2	44.0	43.8	43.6
43.4	43.2	43.0	42.8	42.6	42.4	42.2	42.0	41.8	41.6
41.4	41.3	41.1	40.9	40.7	40.5	40.3	40.1	39.9	39.7
39.6									

NIGHT EX NEG MIN

9	301	100.00	-199.00
117.10	100.00METER		
100.80	1000.00FEET		
90.70	2000.00FEET		
75.10	1.00MILE		
64.10	2.00MILE		
50.60	5.00MILE		
44.60	10.00MILE		
40.60	15.00MILE		
29.00	100000.00METER		

18

NIGHT EX NEG MIN

100.00	1.00
304.80	49.40
609.60	79.50
1609.34	121.66
3218.69	151.77
8046.72	191.56
16093.44	221.66
24140.16	239.27
100000.00	301.00

117.1	116.6	116.3	115.9	115.6	115.2	114.9	114.6	114.2	113.9
113.6	113.2	112.9	112.6	112.2	111.9	111.5	111.2	110.9	110.5
110.2	109.9	109.5	109.2	108.8	108.5	108.2	107.8	107.5	107.2
106.8	106.5	106.2	105.8	105.5	105.1	104.8	104.5	104.1	103.8
103.5	103.1	102.8	102.5	102.1	101.8	101.4	101.1	100.8	100.4
100.1	99.8	99.4	99.1	98.8	98.4	98.1	97.7	97.4	97.1
96.7	96.4	96.1	95.7	95.4	95.1	94.7	94.4	94.1	93.7
93.4	93.1	92.7	92.4	92.0	91.7	91.4	91.0	90.7	90.3
90.0	89.6	89.2	88.9	88.5	88.1	87.7	87.4	87.0	86.6
86.3	85.9	85.5	85.2	84.8	84.4	84.0	83.7	83.3	82.9
82.6	82.2	81.8	81.5	81.1	80.7	80.3	80.0	79.6	79.2
78.9	78.5	78.1	77.8	77.4	77.0	76.6	76.3	75.9	75.5
75.2	74.8	74.4	74.1	73.7	73.3	73.0	72.6	72.2	71.9
71.5	71.1	70.8	70.4	70.0	69.7	69.3	68.9	68.6	68.2
67.9	67.5	67.1	66.8	66.4	66.0	65.7	65.3	64.9	64.6
64.2	63.9	63.5	63.2	62.8	62.5	62.2	61.8	61.5	61.1
60.8	60.5	60.1	59.8	59.4	59.1	58.8	58.4	58.1	57.7
57.4	57.1	56.7	56.4	56.0	55.7	55.4	55.0	54.7	54.4
54.0	53.7	53.3	53.0	52.7	52.3	52.0	51.6	51.3	51.0
50.6	50.4	50.2	50.0	49.8	49.6	49.4	49.2	49.0	48.8
48.6	48.4	48.2	48.0	47.8	47.6	47.4	47.2	47.0	46.8
46.6	46.4	46.2	46.0	45.8	45.6	45.4	45.2	45.0	44.8
44.6	44.4	44.2	44.0	43.7	43.5	43.3	43.0	42.8	42.6
42.4	42.1	41.9	41.7	41.5	41.2	41.0	40.8	40.6	40.4
40.2	40.0	39.8	39.6	39.4	39.2	39.1	38.9	38.7	38.5
38.3	38.1	37.9	37.7	37.6	37.4	37.2	37.0	36.8	36.6
36.4	36.2	36.0	35.9	35.7	35.5	35.3	35.1	34.9	34.7
34.5	34.4	34.2	34.0	33.8	33.6	33.4	33.2	33.0	32.9
32.7	32.5	32.3	32.1	31.9	31.7	31.5	31.3	31.2	31.0
30.8	30.6	30.4	30.2	30.0	29.8	29.7	29.5	29.3	29.1
29.0									

DAY FOCUS PERCENT

7	301	100.00	-199.00

.00	1000.00FEET	304.80	49.40
.00	2000.00FEET	609.60	79.50
.46	1.00MILE	1609.34	121.66
2.30	2.00MILE	3218.69	151.77
9.60	5.00MILE	8046.72	191.56
9.70	10.00MILE	16093.44	221.66
3.10	15.00MILE	24140.16	239.27

19

DAY FOCUS PERCENT

.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.1	.1	.1	.1	.1	.1	.1
.1	.1	.2	.2	.2	.2	.2	.2	.2	.2
.2	.3	.3	.3	.3	.3	.3	.3	.3	.3
.3	.4	.4	.4	.4	.4	.4	.4	.4	.4
.5	.5	.6	.6	.7	.8	.8	.9	.9	1.0
1.1	1.1	1.2	1.2	1.3	1.4	1.4	1.5	1.6	1.6
1.7	1.7	1.8	1.9	1.9	2.0	2.0	2.1	2.2	2.2
2.3	2.4	2.6	2.8	3.0	3.2	3.4	3.5	3.7	3.9
4.1	4.3	4.5	4.6	4.8	5.0	5.2	5.4	5.6	5.7
5.9	6.1	6.3	6.5	6.7	6.8	7.0	7.2	7.4	7.6
7.8	7.9	8.1	8.3	8.5	8.7	8.9	9.0	9.2	9.4
9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
9.6	9.6	9.6	9.6	9.6	9.6	9.7	9.7	9.7	9.7
9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
9.7	9.4	9.0	8.6	8.3	7.9	7.5	7.1	6.8	6.4
6.0	5.6	5.3	4.9	4.5	4.1	3.8	3.4	3.1	3.1
3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
3.1									

DAY BASE PERCENT 20

7	301	100.00	-199.00	DAY BASE PERCENT		
25.07	1000.00FEET				304.80	49.40
32.44	2000.00FEET				609.60	79.50
18.53	1.00MILE				1609.34	121.66
20.60	2.00MILE				3218.69	151.77
25.90	5.00MILE				8046.72	191.56
31.80	10.00MILE				16093.44	221.66
30.00	15.00MILE				24140.16	239.27

25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1
25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1
25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1
25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1
25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.3
25.6	25.8	26.1	26.3	26.6	26.8	27.1	27.3	27.5	27.8
28.0	28.3	28.5	28.8	29.0	29.3	29.5	29.7	30.0	30.2
30.5	30.7	31.0	31.2	31.5	31.7	31.9	32.2	32.4	32.1
31.8	31.5	31.1	30.8	30.5	30.1	29.8	29.5	29.1	28.8
28.5	28.2	27.8	27.5	27.2	26.8	26.5	26.2	25.8	25.5
25.2	24.9	24.5	24.2	23.9	23.5	23.2	22.9	22.5	22.2
21.9	21.6	21.2	20.9	20.6	20.2	19.9	19.6	19.2	18.9
18.6	18.6	18.7	18.7	18.8	18.9	18.9	19.0	19.1	19.1
19.2	19.3	19.3	19.4	19.5	19.6	19.6	19.7	19.8	19.8
19.9	20.0	20.0	20.1	20.2	20.2	20.3	20.4	20.4	20.5
20.6	20.7	20.8	21.0	21.1	21.2	21.4	21.5	21.6	21.8
21.9	22.0	22.2	22.3	22.4	22.6	22.7	22.8	23.0	23.1
23.2	23.4	23.5	23.6	23.8	23.9	24.0	24.2	24.3	24.4
24.6	24.7	24.8	25.0	25.1	25.2	25.4	25.5	25.6	25.8
25.9	26.1	26.3	26.5	26.7	26.9	27.1	27.3	27.5	27.7
27.8	28.0	28.2	28.4	28.6	28.8	29.0	29.2	29.4	29.6
29.8	30.0	30.2	30.4	30.6	30.8	31.0	31.2	31.4	31.6
31.8	31.7	31.6	31.5	31.4	31.3	31.2	31.1	31.0	30.9
30.8	30.7	30.6	30.5	30.4	30.3	30.2	30.1	30.0	30.0
30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
30.0									

DAY NEG PERCENT 21

7 301 100.00 -199.00 DAY NEG PERCENT

72.69	1000.00FEET	304.80	49.40
59.22	2000.00FEET	609.60	79.50
64.88	1.00MILE	1609.34	121.66
39.60	2.00MILE	3218.69	151.77
35.00	5.00MILE	8046.72	191.56
32.60	10.00MILE	16093.44	221.66
32.10	15.00MILE	24140.16	239.27

72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7
72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7
72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7
72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7
72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.2
71.8	71.3	70.9	70.4	70.0	69.5	69.1	68.6	68.2	67.7
67.3	66.8	66.4	65.9	65.5	65.0	64.6	64.1	63.7	63.2
62.8	62.4	61.9	61.5	61.0	60.6	60.1	59.7	59.2	59.4
59.5	59.6	59.8	59.9	60.0	60.2	60.3	60.4	60.6	60.7
60.8	61.0	61.1	61.2	61.4	61.5	61.6	61.8	61.9	62.0
62.2	62.3	62.4	62.6	62.7	62.8	63.0	63.1	63.2	63.4
63.5	63.6	63.8	63.9	64.1	64.2	64.3	64.5	64.6	64.7
64.9	64.2	63.3	62.5	61.7	60.8	60.0	59.1	58.3	57.5
56.6	55.8	54.9	54.1	53.3	52.4	51.6	50.7	49.9	49.1
48.2	47.4	46.5	45.7	44.9	44.0	43.2	42.3	41.5	40.7
39.8	39.5	39.4	39.3	39.2	39.1	38.9	38.8	38.7	38.6
38.5	38.4	38.2	38.1	38.0	37.9	37.8	37.7	37.6	37.4
37.3	37.2	37.1	37.0	36.9	36.7	36.6	36.5	36.4	36.3
36.2	36.0	35.9	35.8	35.7	35.6	35.5	35.4	35.2	35.1
35.0	34.9	34.8	34.8	34.7	34.6	34.5	34.4	34.4	34.3
34.2	34.1	34.0	34.0	33.9	33.8	33.7	33.6	33.6	33.5
33.4	33.3	33.3	33.2	33.1	33.0	32.9	32.9	32.8	32.7
32.6	32.6	32.5	32.5	32.5	32.5	32.4	32.4	32.4	32.3
32.3	32.3	32.3	32.2	32.2	32.2	32.2	32.1	32.1	32.1
32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1
32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1
32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1
32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1
32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1
32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1
32.1									

DAY EX NEG PERCENT				22
7	301	100.00	-199.00	DAY EX NEG PERCENT
2.24	1000.00FEET		304.80	49.40
8.34	2000.00FEET		609.60	79.50
16.13	1.00MILE		1609.34	121.66
37.50	2.00MILE		3218.69	151.77
29.50	5.00MILE		8046.72	191.56
25.90	10.00MILE		16093.44	221.66
34.80	15.00MILE		24140.16	239.27

2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5
2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1	4.3	4.5
4.7	4.9	5.1	5.3	5.5	5.7	5.9	6.1	6.3	6.5
6.7	6.9	7.1	7.3	7.5	7.7	7.9	8.1	8.3	8.5
8.7	8.9	9.1	9.3	9.4	9.6	9.8	10.0	10.2	10.4
10.6	10.7	10.9	11.1	11.3	11.5	11.7	11.8	12.0	12.2
12.4	12.6	12.8	13.0	13.1	13.3	13.5	13.7	13.9	14.1
14.3	14.4	14.6	14.8	15.0	15.2	15.4	15.5	15.7	15.9
16.1	16.7	17.4	18.1	18.9	19.6	20.3	21.0	21.7	22.4
23.1	23.8	24.5	25.2	26.0	26.7	27.4	28.1	28.8	29.5
30.2	30.9	31.6	32.3	33.1	33.8	34.5	35.2	35.9	36.6
37.3	37.4	37.2	37.0	36.7	36.5	36.3	36.1	35.9	35.7
35.5	35.3	35.1	34.9	34.7	34.5	34.3	34.1	33.9	33.7
33.5	33.3	33.1	32.9	32.7	32.5	32.3	32.1	31.9	31.7
31.5	31.3	31.1	30.9	30.7	30.5	30.3	30.1	29.9	29.7
29.5	29.4	29.3	29.1	29.0	28.9	28.8	28.7	28.6	28.4
28.3	28.2	28.1	28.0	27.8	27.7	27.6	27.5	27.4	27.2
27.1	27.0	26.9	26.8	26.6	26.5	26.4	26.3	26.2	26.0
25.9	26.3	26.8	27.3	27.8	28.3	28.8	29.4	29.9	30.4
30.9	31.4	31.9	32.4	32.9	33.4	33.9	34.4	34.8	34.8
34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8
34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8
34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8
34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8
34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8
34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8
34.8									

NIGHT FOCUS PERCENT				23	
7	301	100.00	-199.00	NIGHT FOCUS PERCENT	
.00	1000.00FEET			304.80	49.40
.00	2000.00FEET			609.60	79.50
2.64	1.00MILE			1609.34	121.66
6.10	2.00MILE			3218.69	151.77
7.60	5.00MILE			8046.72	191.56
7.10	10.00MILE			16093.44	221.66
4.40	15.00MILE			24140.16	239.27

.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
.1	.2	.3	.3	.4	.4	.5	.6	.6	.7
.8	.8	.9	.9	1.0	1.1	1.1	1.2	1.3	1.3
1.4	1.4	1.5	1.6	1.6	1.7	1.8	1.8	1.9	1.9
2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.4	2.5	2.6
2.6	2.7	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.7
3.8	3.9	4.0	4.1	4.2	4.3	4.5	4.6	4.7	4.8
4.9	5.0	5.1	5.3	5.4	5.5	5.6	5.7	5.8	6.0
6.1	6.1	6.2	6.2	6.2	6.3	6.3	6.4	6.4	6.4
6.5	6.5	6.5	6.6	6.6	6.7	6.7	6.7	6.8	6.8
6.8	6.9	6.9	7.0	7.0	7.0	7.1	7.1	7.1	7.2
7.2	7.3	7.3	7.3	7.4	7.4	7.4	7.5	7.5	7.6
7.6	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.5	7.5
7.4	7.4	7.4	7.4	7.4	7.4	7.3	7.3	7.3	7.3
7.3	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.1	7.1
7.1	7.0	6.8	6.7	6.5	6.4	6.2	6.1	5.9	5.7
5.6	5.4	5.3	5.1	5.0	4.8	4.7	4.5	4.4	4.4
4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
4.4									

NIGHT BASE PERCENT   24

7	301	100.00	-199.00	NIGHT BASE PERCENT		
27.34	1000.00FEET				304.80	49.40
47.67	2000.00FEET				609.60	79.50
65.86	1.00MILE				1609.34	121.66
39.00	2.00MILE				3218.69	151.77
27.30	5.00MILE				8046.72	191.56
20.00	10.00MILE				16093.44	221.66
16.70	15.00MILE				24140.16	239.27

27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3
27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3
27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3
27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3
27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	28.1
28.8	29.4	30.1	30.8	31.5	32.1	32.8	33.5	34.2	34.8
35.5	36.2	36.9	37.5	38.2	38.9	39.6	40.2	40.9	41.6
42.3	42.9	43.6	44.3	45.0	45.6	46.3	47.0	47.7	48.1
48.5	49.0	49.4	49.8	50.3	50.7	51.1	51.6	52.0	52.4
52.8	53.3	53.7	54.1	54.6	55.0	55.4	55.9	56.3	56.7
57.2	57.6	58.0	58.5	58.9	59.3	59.7	60.2	60.6	61.0
61.5	61.9	62.3	62.8	63.2	63.6	64.1	64.5	64.9	65.4
65.8	65.1	64.2	63.3	62.4	61.5	60.7	59.8	58.9	58.0
57.1	56.2	55.3	54.4	53.5	52.6	51.7	50.8	49.9	49.1
48.2	47.3	46.4	45.5	44.6	43.7	42.8	41.9	41.0	40.1
39.2	38.8	38.5	38.2	37.9	37.6	37.3	37.0	36.7	36.4
36.1	35.8	35.6	35.3	35.0	34.7	34.4	34.1	33.8	33.5
33.2	32.9	32.6	32.3	32.0	31.7	31.4	31.1	30.8	30.6
30.3	30.0	29.7	29.4	29.1	28.8	28.5	28.2	27.9	27.6
27.3	27.1	26.8	26.6	26.3	26.1	25.9	25.6	25.4	25.1
24.9	24.6	24.4	24.2	23.9	23.7	23.4	23.2	22.9	22.7
22.5	22.2	22.0	21.7	21.5	21.3	21.0	20.8	20.5	20.3
20.0	19.8	19.7	19.5	19.3	19.1	18.9	18.7	18.5	18.3
18.2	18.0	17.8	17.6	17.4	17.2	17.0	16.8	16.7	16.7
16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
16.7									

NIGHT NEG PERCENT 25

7	301	100.00	-199.00	NIGHT NEG PERCENT		
72.66	1000.00FEET				304.80	49.40
44.21	2000.00FEET				609.60	79.50
24.35	1.00MILE				1609.34	121.66
29.50	2.00MILE				3218.69	151.77
31.30	5.00MILE				8046.72	191.56
25.00	10.00MILE				16093.44	221.66
33.70	15.00MILE				24140.16	239.27

72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7
72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7
72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7
72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7
72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	71.6
70.7	69.7	68.8	67.8	66.9	66.0	65.0	64.1	63.1	62.2
61.2	60.3	59.3	58.4	57.4	56.5	55.6	54.6	53.7	52.7
51.8	50.8	49.9	48.9	48.0	47.0	46.1	45.2	44.2	43.7
43.3	42.8	42.3	41.9	41.4	40.9	40.4	40.0	39.5	39.0
38.6	38.1	37.6	37.1	36.7	36.2	35.7	35.3	34.8	34.3
33.8	33.4	32.9	32.4	32.0	31.5	31.0	30.6	30.1	29.6
29.1	28.7	28.2	27.7	27.3	26.8	26.3	25.8	25.4	24.9
24.4	24.5	24.7	24.8	25.0	25.2	25.3	25.5	25.7	25.9
26.0	26.2	26.4	26.5	26.7	26.9	27.1	27.2	27.4	27.6
27.7	27.9	28.1	28.3	28.4	28.6	28.8	28.9	29.1	29.3
29.5	29.5	29.6	29.6	29.7	29.7	29.8	29.8	29.8	29.9
29.9	30.0	30.0	30.1	30.1	30.2	30.2	30.3	30.3	30.3
30.4	30.4	30.5	30.5	30.6	30.6	30.7	30.7	30.8	30.8
30.8	30.9	30.9	31.0	31.0	31.1	31.1	31.2	31.2	31.3
31.3	31.1	30.9	30.7	30.5	30.3	30.1	29.8	29.6	29.4
29.2	29.0	28.8	28.6	28.4	28.2	28.0	27.8	27.5	27.3
27.1	26.9	26.7	26.5	26.3	26.1	25.9	25.7	25.5	25.2
25.0	25.4	25.9	26.4	26.9	27.4	27.9	28.4	28.9	29.4
29.9	30.4	30.8	31.3	31.8	32.3	32.8	33.3	33.7	33.7
33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7
33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7
33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7
33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7
33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7
33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7
33.7									

NIGHT EX NEG PERCENT					26
7	301	100.00	-199.00	NIGHT EX NEG PERCENT	
.00	1000.00FEET			304.80	49.40
8.12	2000.00FEET			609.60	79.50
7.15	1.00MILE			1609.34	121.66
25.40	2.00MILE			3218.69	151.77
33.80	5.00MILE			8046.72	191.56
47.90	10.00MILE			16093.44	221.66
45.20	15.00MILE			24140.16	239.27

.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.3
.6	.8	1.1	1.4	1.6	1.9	2.2	2.5	2.7	3.0
3.3	3.5	3.8	4.1	4.3	4.6	4.9	5.2	5.4	5.7
6.0	6.2	6.5	6.8	7.0	7.3	7.6	7.8	8.1	8.1
8.1	8.1	8.0	8.0	8.0	8.0	7.9	7.9	7.9	7.9
7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.7	7.7	7.6
7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.5	7.4	7.4
7.4	7.4	7.3	7.3	7.3	7.3	7.2	7.2	7.2	7.2
7.2	7.7	8.3	8.9	9.5	10.1	10.7	11.3	11.9	12.5
13.1	13.7	14.3	14.9	15.5	16.1	16.8	17.4	18.0	18.6
19.2	19.8	20.4	21.0	21.6	22.2	22.8	23.4	24.0	24.6
25.2	25.6	25.8	26.0	26.2	26.4	26.6	26.8	27.0	27.2
27.5	27.7	27.9	28.1	28.3	28.5	28.7	28.9	29.1	29.4
29.6	29.8	30.0	30.2	30.4	30.6	30.8	31.0	31.3	31.5
31.7	31.9	32.1	32.3	32.5	32.7	32.9	33.2	33.4	33.6
33.8	34.2	34.7	35.2	35.6	36.1	36.6	37.0	37.5	38.0
38.5	38.9	39.4	39.9	40.3	40.8	41.3	41.7	42.2	42.7
43.1	43.6	44.1	44.5	45.0	45.5	45.9	46.4	46.9	47.4
47.8	47.8	47.6	47.5	47.3	47.2	47.0	46.9	46.7	46.5
46.4	46.2	46.1	45.9	45.8	45.6	45.5	45.3	45.2	45.2
45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2
45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2
45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2
45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2
45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2
45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2	45.2
45.2									

CHARGE SIZE	CORRECTI			27	
21	601	100.00	201.00	CHARGE SIZE	CORRECTI
-29.80	.01			.01	5.14
-26.10	.02			.02	28.88
-22.50	.04			.04	61.21
-18.90	.08			.08	90.21
-15.40	.16			.16	120.38
-12.00	.31			.31	150.49
-8.80	.63			.63	180.59
-5.60	1.25			1.25	210.69
-2.70	2.50			2.50	240.79
.00	5.00			5.00	270.90
2.40	10.00			10.00	301.00
4.60	20.00			20.00	331.10
6.60	40.00			40.00	361.21
8.50	80.00			80.00	391.31
10.20	160.00			160.00	421.41
11.80	320.00			320.00	451.52
13.40	640.00			640.00	481.62
14.90	1280.00			1280.00	511.72
16.40	2560.00			2560.00	541.82
17.60	5120.00			5120.00	571.93
18.20	9999.00			9999.00	601.00

-29.8	-29.8	-29.8	-29.8	-29.8	-29.6	-29.4	-29.3	-29.1	-29.0
-28.8	-28.7	-28.5	-28.3	-28.2	-28.0	-27.9	-27.7	-27.6	-27.4
-27.2	-27.1	-26.9	-26.8	-26.6	-26.5	-26.3	-26.2	-26.0	-25.9
-25.8	-25.7	-25.6	-25.5	-25.4	-25.3	-25.1	-25.0	-24.9	-24.8
-24.7	-24.6	-24.5	-24.4	-24.2	-24.1	-24.0	-23.9	-23.8	-23.7
-23.6	-23.5	-23.4	-23.2	-23.1	-23.0	-22.9	-22.8	-22.7	-22.6
-22.5	-22.3	-22.2	-22.1	-22.0	-21.8	-21.7	-21.6	-21.5	-21.3
-21.2	-21.1	-21.0	-20.8	-20.7	-20.6	-20.5	-20.4	-20.2	-20.1
-20.0	-19.9	-19.7	-19.6	-19.5	-19.4	-19.2	-19.1	-19.0	-18.9
-18.8	-18.6	-18.5	-18.4	-18.3	-18.2	-18.1	-17.9	-17.8	-17.7
-17.6	-17.5	-17.4	-17.2	-17.1	-17.0	-16.9	-16.8	-16.7	-16.5
-16.4	-16.3	-16.2	-16.1	-16.0	-15.9	-15.7	-15.6	-15.5	-15.4
-15.3	-15.2	-15.0	-14.9	-14.8	-14.7	-14.6	-14.5	-14.4	-14.3
-14.1	-14.0	-13.9	-13.8	-13.7	-13.6	-13.5	-13.4	-13.2	-13.1
-13.0	-12.9	-12.8	-12.7	-12.6	-12.5	-12.3	-12.2	-12.1	-12.0
-11.9	-11.8	-11.7	-11.6	-11.5	-11.4	-11.3	-11.1	-11.0	-10.9
-10.8	-10.7	-10.6	-10.5	-10.4	-10.3	-10.2	-10.1	-10.0	-9.9
-9.8	-9.7	-9.6	-9.4	-9.3	-9.2	-9.1	-9.0	-8.9	-8.8
-8.7	-8.6	-8.5	-8.4	-8.3	-8.2	-8.1	-8.0	-7.9	-7.7
-7.6	-7.5	-7.4	-7.3	-7.2	-7.1	-7.0	-6.9	-6.8	-6.7
-6.6	-6.5	-6.4	-6.3	-6.2	-6.0	-5.9	-5.8	-5.7	-5.6
-5.5	-5.4	-5.3	-5.2	-5.1	-5.0	-4.9	-4.8	-4.8	-4.7
-4.6	-4.5	-4.4	-4.3	-4.2	-4.1	-4.0	-3.9	-3.8	-3.7
-3.6	-3.5	-3.4	-3.3	-3.2	-3.1	-3.0	-2.9	-2.8	-2.7
-2.6	-2.5	-2.5	-2.4	-2.3	-2.2	-2.1	-2.0	-1.9	-1.8
-1.7	-1.7	-1.6	-1.5	-1.4	-1.3	-1.2	-1.1	-1.0	-.9
-.8	-.8	-.7	-.6	-.5	-.4	-.3	-.2	-.1	.0
.0	.1	.2	.3	.4	.4	.5	.6	.7	.8
.8	.9	1.0	1.1	1.2	1.2	1.3	1.4	1.5	1.6
1.6	1.7	1.8	1.9	2.0	2.0	2.1	2.2	2.3	2.4
2.4	2.5	2.6	2.7	2.7	2.8	2.9	2.9	3.0	3.1
3.2	3.2	3.3	3.4	3.5	3.5	3.6	3.7	3.8	3.8
3.9	4.0	4.0	4.1	4.2	4.3	4.3	4.4	4.5	4.6
4.6	4.7	4.8	4.8	4.9	5.0	5.0	5.1	5.2	5.2
5.3	5.4	5.4	5.5	5.6	5.6	5.7	5.8	5.8	5.9
6.0	6.0	6.1	6.2	6.2	6.3	6.4	6.4	6.5	6.6
6.6	6.7	6.7	6.8	6.9	6.9	7.0	7.1	7.1	7.2
7.2	7.3	7.4	7.4	7.5	7.6	7.6	7.7	7.8	7.8
7.9	7.9	8.0	8.1	8.1	8.2	8.3	8.3	8.4	8.4
8.5	8.6	8.6	8.7	8.7	8.8	8.8	8.9	9.0	9.0
9.1	9.1	9.2	9.2	9.3	9.4	9.4	9.5	9.5	9.6
9.6	9.7	9.8	9.8	9.9	9.9	10.0	10.0	10.1	10.1
10.2	10.3	10.3	10.4	10.4	10.5	10.5	10.6	10.6	10.7
10.7	10.8	10.8	10.9	10.9	11.0	11.1	11.1	11.2	11.2
11.3	11.3	11.4	11.4	11.5	11.5	11.6	11.6	11.7	11.7
11.8	11.9	11.9	12.0	12.0	12.1	12.1	12.2	12.2	12.3
12.3	12.4	12.4	12.5	12.5	12.6	12.6	12.7	12.8	12.8
12.9	12.9	13.0	13.0	13.1	13.1	13.2	13.2	13.3	13.3
13.4	13.4	13.5	13.5	13.6	13.6	13.7	13.7	13.8	13.8
13.9	13.9	14.0	14.0	14.1	14.1	14.2	14.2	14.3	14.3
14.4	14.4	14.5	14.5	14.6	14.6	14.7	14.7	14.8	14.8
14.9	14.9	15.0	15.0	15.1	15.1	15.2	15.2	15.3	15.3
15.4	15.4	15.5	15.5	15.6	15.6	15.7	15.7	15.8	15.8
15.9	15.9	16.0	16.0	16.1	16.1	16.2	16.2	16.3	16.3
16.4	16.4	16.5	16.5	16.5	16.6	16.6	16.7	16.7	16.7
16.8	16.8	16.9	16.9	16.9	17.0	17.0	17.1	17.1	17.1
17.2	17.2	17.3	17.3	17.3	17.4	17.4	17.5	17.5	17.5
17.6	17.6	17.6	17.7	17.7	17.7	17.7	17.7	17.8	17.8
17.8	17.8	17.8	17.9	17.9	17.9	17.9	17.9	18.0	18.0
18.0	18.0	18.0	18.1	18.1	18.1	18.1	18.1	18.2	18.2
18.2									

Stop - Program terminated.

APPENDIX C:

SAMPLE MICROBNOISE SESSION

C:>**BNOISE**	Typed at DOS prompt, this activates the Bnoise program
C:BNOISE>ECHO OFF	Program operating
SELECT WEAPON CODES (0 TO END, 99 FOR ALL)	Choose weapons to be used in blast noise simulation
WEAPON CODE: **2**	From Table 1
WEAPON CODE: **22**	From Table 1
WEAPON CODE: **10**	From Table 1
WEAPON CODE: **80** INVALID WEAPON CODE	Weapon code not included in existing database
DO YOU WANT INPUT DATA FOR THIS CODE? **Y**	To create a new weapon code
PROJECTILE WEIGHT: **10.5**	weight of explosive in projectile
PROPELLANT WEIGHT FOR CHARGE ZONE 1: **1.2**	Amount of propellant used in various weapon configurations
PROPELLANT WEIGHT FOR CHARGE ZONE 2: **3.4**	Amount of propellant used in various weapon configurations
PROPELLANT WEIGHT FOR CHARGE ZONE 3: **5.7**	Amount of propellant used in various weapon configurations
PROPELLANT WEIGHT FOR CHARGE ZONE 4: **7.3**	Amount of propellant used in various weapon configurations
PROPELLANT WEIGHT FOR CHARGE ZONE 5: **9.2**	Amount of propellant used in various weapon configurations
PROPELLANT WEIGHT FOR CHARGE ZONE 6: **12.1**	Amount of propellant used in various weapon configurations
PROPELLANT WEIGHT FOR CHARGE ZONE 7. **0**	Enter 0 for nonexistent configuration
PROPELLANT WEIGHT FOR CHARGE ZONE 8: **0**	Enter 0 for nonexistent configuration
PROPELLANT WEIGHT FOR CHARGE ZONE 9: **0**	Enter 0 for nonexistent configuration

PROPELLANT WEIGHT FOR CHARGE ZONE 10: **0**	Enter 0 for nonexistent configuration
NAME OF WEAPON: **EXPERIMENTAL**	Designation of new weapon (20 chars max)
PARAMETER A: **83.79**	From Table 3
PARAMETER B: **13.91**	From Table 3
DECIBEL DIFFERENCE AT 0 DEGREES: **17.80**	Front of gun
DECIBEL DIFFERENCE AT 30 DEGREES: **13.91**	See Table 3
DECIBEL DIFFERENCE AT 60 DEGREES: **10.02**	See Table 3
DECIBEL DIFFERENCE AT 90 DEGREES: **6.46**	See Table 3
DECIBEL DIFFERENCE AT 120 DEGREES: **2.97**	See Table 3
DECIBEL DIFFERENCE AT 150 DEGREES: **0.53**	See Table 3
AVERAGE DECIBEL DIFFERENCE: **10.84**	See Table 3
WEAPON CODE: **0**	End new weapon input
ENTER TARGET DATA	
DO YOU WANT TO INPUT FROM A FILE? N	Use either existing target data file (Y) or create new target data file (N)
ADD, DELETE, LIST, SAVE OR END: **A**	ADD a new target data file
TARGET ID: **TP1**	Target I.D. (3 chars max)
LOCATION, X-COORDINATE: **27000**	X coordinate of target point
LOCATION, Y-COORDINATE: **25000**	Y coordinate of target point
GROUND CORRECTION FACTOR (dB) [1.5]: **0**	Default used (1.5 dB)
ADD, DELETE, LIST, SAVE OR END: **A**	ADD a new target data file

TARGET ID: **TP2**	Target I.D. (3 chars max)
LOCATION, X-COORDINATE: **32000**	X coordinate of target point
LOCATION, Y-COORDINATE: **25000**	Y coordinate of target point
GROUND CORRECTION FACTOR (dB) [1.5]: **0**	Default used (1.5 dB)
ADD, DELETE, LIST, SAVE OR END: **L** TP1 27000.25000. 0. TP2 32000.25000. 0.	LIST target point data
ADD, DELETE, LIST, SAVE OR END: **S**	SAVE target point data in a file
FILE NAME: **TTEST.DAT**	Target point data filename
ADD, DELETE, LIST, SAVE OR END: **E**	END target data input
ENTER FIRING POINT DATA	
DO YOU WANT TO INPUT FROM A FILE? **N**	Use either an existing file (Y) or create a new file (N)
ADD, DELETE, LIST, SAVE OR END: **A**	ADD a new firing point data file
FIRING POINT ID: **FP1**	Firing point I.D. (3 chars max)
LOCATION, X-COORDINATE: **29000**	X coordinate of firing point
LOCATION, Y-COORDINATE: **23000**	Y coordinate of firing point
GROUND CORRECTION FACTOR (dB) [1.5]: **0**	Default used (1.5 dB)
GUN TYPE (CODE): **80**	New gun type
NUMBER OF DAY FIRINGS [0]: **0**	Default used (0)
NUMBER OF NIGHT FIRINGS [0]: **17**	Default is 0
MIN CHARGE ZONE: **3**	Minimum propellant charge weight zone used from Table 2

MAX CHARGE ZONE: **4**	Maximum propellant charge weight zone used from Table 2
CORRESPONDING TARGET ID: **TP1**	Target location to be used
IS THERE NOISE AT THE TARGET? **Y**	Y or N
HEIGHT (IN FEET): **100**	Distance above or below ground of detonation
ARE THERE MORE GUN TYPES FOR THIS ID? **Y**	
GUN TYPE (CODE): **22**	New gun type
NUMBER OF DAY FIRINGS [0]: **300**	Default is 0
NUMBER OF NIGHT FIRINGS [0]: **25**	Default is 0
MIN CHARGE ZONE: **5**	Minimum propellant charge weight zone used from Table 2
MAX CHARGE ZONE: **7**	Maximum propellant charge weight zone used from Table 2
CORRESPONDING TARGET ID: **TP2**	Target location to be used
IS THERE NOISE AT THE TARGET? **N**	Y or N
HEIGHT (IN FEET): **0**	Distance above or below ground of detonation
ARE THERE MORE GUN TYPES FOR THIS ID? **N**	
ADD, DELETE, LIST, SAVE OR END: **A**	ADD a new firing point data file
FIRING POINT ID: **FP2**	New firing point
LOCATION, X-COORDINATE: **35000**	X coordinate of firing point
LOCATION, Y-COORDINATE: **20000**	Y coordinate of firing point
GROUND CORRECTION FACTOR (dB) [1.5]: **0**	Default used (1.5 dB)
GUN TYPE (CODE): **2**	New gun type

NUMBER OF DAY FIRINGS [0]: **150**	Default is 0
NUMBER OF NIGHT FIRINGS [0]: **10**	Default is 0
MIN CHARGE ZONE: **4**	Minimum propellant charge weight zone used from Table 2
MAX CHARGE ZONE: **5**	Maximum propellant charge weight zone used from Table 2
CORRESPONDING TARGET ID: **TP2**	Target location to be used
IS THERE NOISE AT THE TARGET? **Y**	Y or N
HEIGHT (IN FEET): **0**	Distance above or below ground of detonation
ARE THERE MORE GUN TYPES FOR THIS ID? N	
ADD, DELETE, LIST, SAVE OR END: **A**	ADD new firing point data
FIRING POINT ID: **FP3**	New firing point
LOCATION, X-COORDINATE: **32000**	X coordinate of firing point
LOCATION, Y-COORDINATE: **28000**	Y coordinate of firing point
GROUND CORRECTION FACTOR (dB) [1.5]: **0**	Default used (1.5 dB)
GUN TYPE (CODE): **10**	New gun type
NUMBER OF DAY FIRINGS [0]: **100**	Default is 0
NUMBER OF NIGHT FIRINGS [0]: **0**	Default is 0
MIN CHARGE ZONE: **5**	Minimum propellant charge weight zone used from Table 2
MAX CHARGE ZONE: **5**	Maximum propellant charge weight zone used from Table 2
CORRESPONDING TARGET ID:	Target location to be used

HEIGHT (IN FEET): **0**	Distance above or below ground of detonation
ARE THERE MORE GUN TYPES FOR THIS ID? **N**	
ADD, DELETE, LIST, SAVE OR END: **L**	LIST firing point data
FIRING POINT ID **FP1** FP1 29000.23000 0. 80 0 17 3 4TP10 100. 20 300 25 5 7TP21 0.	
ADD, DELETE, LIST, SAVE OR END: **S**	SAVE firing point data
FILE NAME: **FTEST.DATA**	Firing point data file name
ADD, DELETE, LIST, SAVE OR END: **E**	END firing point data input
ENTER MODULE DATA	
DO YOU WANT TO INPUT FROM A FILE? **N**	Use either existing module data (Y) or create new module data (N)
METERS OR FEET? **METERS**	Units of distance measurement (usually meters)

ENTER MAP MODULE DATA	
PRINT DATA BASE INFORMATION? **Y**	Information to be printed
PRINT TARGET VS FIRING POINT TABLE? **Y**	Information to be printed
PRINT TARGET VS GUN TYPE TABLE? **Y**	Information to be printed
PRINT GUN TYPE VS TARGET TABLE? **Y**	Information to be printed
PRINT GUN TYPE VS FIRING POINT TABLE? **Y**	Information to be printed
PRINT "EXTRANEOUS DATA" MESSAGE? **Y**	Information to be printed
NUMBER OF DAYS OF INFORMATION IN DATA BASE [1]: **30**	Default is 1
NUMBER OF GRID SIZES TO BE TESTED: **1**	Only one needed usually
GRID SIZE: **250**	Distance between points used in grid

ENTER BOUNDS MODULE DATA	
MINIMUM X COORDINATE: **14000**	Minimum value of X coordinate used for border of plot
MINIMUM Y COORDINATE: **0**	Minimum value of Y coordinate used for border of plot
MAXIMUM X COORDINATE: **50000**	Maximum value of X coordinate used for border of plot
MAXIMUM Y COORDINATE: **39000**	Maximum value of Y coordinate used for border of plot
ANY BASE MODULE DATA? **Y**	Base module will draw installation, labels, etc.
STARTING NEW OUTLINE	
X COORDINATE: **19000**	These points are used to specify the registration mark in the upper left hand corner of Figures 1 and 2
Y COORDINATE: **8000**	These points are used to specify the registration mark in the upper left hand corner of Figures 1 and 2
X COORDINATE: **21000**	These points are used to specify the registration mark in the upper left hand corner of Figures 1 and 2

Y COORDINATE: **8000**	These points are used to specify the registration mark in the upper left hand corner of Figures 1 and 2
IS THIS THE END OF A CONTINUOUS LINE? **Y**	Lifts pen
IS THIS THE LAST LINE? **N**	
STARTING NEW OUTLINE	
X COORDINATE: **20000**	These points are used to specify the registration mark in the upper left hand corner of Figures 1 and 2
Y COORDINATE: **7000**	These points are used to specify the registration mark in the upper left hand corner of Figures 1 and 2
X COORDINATE: **20000**	These points are used to specify the registration mark in the upper left hand corner of Figures 1 and 2
Y COORDINATE: **9000**	These points are used to specify the registration mark in the upper left hand corner of Figures 1 and 2

IS THIS THE END OF A CONTINUOUS LINE? **Y**	Lifts pen
IS THIS THE LAST LINE? **N**	
STARTING NEW OUTLINE	
X COORDINATE: **24000**	These points are used to specify the outline of the installation
Y COORDINATE: **10000**	These points are used to specify the outline of the installation
X COORDINATE: **40000**	These points are used to specify the outline of the installation
Y COORDINATE: **10000**	These points are used to specify the outline of the installation
IS THIS THE END OF A CONTINUOUS LINE? **N**	Pen stays down
X COORDINATE: **40000**	These points are used to specify the outline of the installation
Y COORDINATE: **25000**	These points are used to specify the outline of the installation
IS THIS THE END OF A CONTINUOUS LINE? **N**	Pen stays down
X COORDINATE: **32000**	These points are used to specify the outline of the installation
Y COORDINATE: **30000**	These points are used to specify the outline of the installation
IS THIS THE END OF A CONTINUOUS LINE? **N**	Pen stays down
X COORDINATE: **24000**	These points are used to specify the outline of the installation
Y COORDINATE: **25000**	These points are used to specify the outline of the installation
IS THIS THE END OF A CONTINUOUS LINE? **N**	Pen stays down
X COORDINATE: **24000**	These points are used to specify the outline of the installation
Y COORDINATE: **10000**	These points are used to specify the outline of the installation
IS THIS THE END OF A CONTINUOUS LINE? **Y**	Lifts pen

IS THIS THE LAST LINE? **Y**	End of installation boundary
ENTER FORMA MODULE DATA	
CHARGE AVERAGING TECHNIQUE (MAX,IAVE,CAVE): **MAX**	Use maximum charge zone (MAX), average of charge zones (IAVE), or use the actual TNT charge equivalents (CAVE)
GROUND CORRECTION (dB) [1.5]: **0**	Default used (1.5 dB)
ANY PUDDLE GRID MODULE DATA? **Y**	
INVERSION FACTOR 1: **65.8**	From Table 5
INVERSION FACTOR 2: **15.5**	From Table 5
INVERSION FACTOR 3: **27.9**	From Table 5
GRID SIZE [2000]: **0**	Default used (2000 meters)
"DAY", "NIGHT" OR "BOTH": **BOTH**	BOTH day and night noise included
ANY POINT MODULE DATA? **N**	Noise at a specific point not calculated
ANY SCATTER MODULE DATA? **Y**	A scattergram is desired
SCATTER INFORMATION COLLECTED FOR TARGETS? **Y**	Target points included
SCATTER INFORMATION COLLECTED FOR FIRING POINTS? **Y**	Firing points included
DAY (D), NIGHT (N) OR BOTH (B) DATA: **B**	Both day and night firings are included
DO YOU WANT TO SPECIFY GUN TYPES? **N**	
MULTIPLIER [1]: **2**	Scatter points are multiplied by this factor before division by number of days
STANDARD DEVIATION [300]: **0**	Default chosen, expressed in meters or feet depending upon user selection
ANY LOCATOR MODULE DATA? **Y**	
"ALL", "TARGET" OR "FIRING": **ALL**	ALL points to market on plot

PRINT ID ON PLOT? **N**	
PRINT COORDINATES? **N**	
SIZE OF LETTERS [0.14]: **0**	Height of letters (inches), default chosen
ROTATION OF LETTERS [0 DEG]: **0**	Text relative to plot, default chosen
ANY PLOT MODULE DATA? **Y**	Plot of contours desired
USE PUDDLE GRID OUTPUT? **Y**	Using puddle grid data file
USE LOCATOR OUTPUT? **Y**	Using locator data file
USE SCATTER OUTPUT? **N**	No scattergram used on contour plot
USE BASE OUTPUT? **Y**	Include base module output
SCALE [50000]: **0**	Default used, must be between 1000 and 100,000
%X [1.0]: **0**	Default used
%Y [1.0]: **0**	Default used, must be between
MAGNIFICATION [1.0]: **0.22**	Increase or decrease size of plot, default is 1.0
% SMOOTHING [0.333]: **0**	Use default (0.333)
FIRST CONTOUR LEVEL TO BE PLOTTED [65]: **55**	Sound level in dB to be plotted; default is 65dB
LAST CONTOUR LEVEL TO BE PLOTTED [75]: **75**	Sound level in dB to be plotted; default is 75dB
CONTOUR INCREMENT [10]: **5**	Sound difference (in dB) between contours; default is 10dB
DO YOU WANT LABELS? **Y**	Labels attached to contours
FIRST CONTOUR TO BE LABELED [65]: **55**	Label 55dB contour
LAST CONTOUR TO BE LABELED [75]: **75**	Label 75dB contour

LABEL INCREMENT [10]: **5**	Label 5dB contour increments
ANY ADDITIONAL TEXT TO DISPLAY? **N**	No additional text included with plot
MORE PLOTS? **Y**	Scattergram is next
USE PUDDLE GRID OUTPUT? **N**	Don't use puddle grid output
USE LOCATOR OUTPUT? **N**	Don't use locator file output
USE SCATTER OUTPUT? **Y**	Use scatter file output
USE BASE OUTPUT? **Y**	Include installation outline
SCALE [50000]: **0**	Default used
%X [1.0]: **0**	Default used
%Y [1.0]: **0**	Default used
MAGNIFICATION [1.0]: **0.22**	Same size as contours, default is 1.0
%SMOOTHING [0.333]: **0**	Use default (0.333)
FIRST CONTOUR LEVEL TO BE PLOTTED [65]: **0**	Default used although contours won't be shown
LAST CONTOUR LEVEL TO BE PLOTTED [75]: **0**	Default used although contours won't be shown
CONTOUR INCREMENT [10]: **0**	Default used although contours won't be shown
DO YOU WANT LABELS? **N**	No contour labels included
ANY ADDITIONAL TEXT TO DISPLAY? **N**	No additional text included
MORE PLOTS? **N**	End of module data input
SAVE MODULE DATA ON FILE? **Y**	Save module data in a file for later use

```
FILE NAME: MTEST.DAT

TIME IN EDITOR IS  12.6 MINUTES

PRINTED OUTPUT IS TO BE DIRECTED TO: 1 - SCREEN 2 - LINE PRINTER 3 - FILE

ENTER CHOICE: 3

ENTER FILENAME: BTEST.DAT

TIME IN LCDN IS  2.0 MINUTES

Resident portion of MODE loaded

COM2: 9600,n,8,1,p

COM1: 9600,n,8,1,p

ARE YOU USING "COM1" OR "COM2" FOR YOUR PLOTTER? COM2
 INSERT PAPER IN PLOTTER
 PUT BLACK PEN IN SLOT 1 (LEFT)
 PUT GREEN PEN IN SLOT 2 (RIGHT) Pause. Please press
<return> to continue.

CHANGE PEN 2 Pause. Please press <return> to continue.

CHANGE PEN 2 Pause. Please press <return> to continue.

CHANGE PEN 2 Pause. Please press <return> to continue.

CHANGE PEN 2 Pause. Please press <return> to continue.

CHANGE PAPER Pause. Please press <return> to continue.

TIME IN NASAPLOT IS  6.2 MINUTES

ANOTHER COPY OF THE PLOT(S)? N
```

```
                                DISTANCES EXPRESSED IN METERS


                          THRESH       85.0
                          PENITE       10.0
                          PPIP    .1000E+01
                          IMP             0
```

Figure D1. MicroBNOISE header: coordinate units and data used by Program LCDN.


```
          .....     MAP OF SOURCE POINTS     .....

          .....     GUN TYPE CARDS     .....

     FLAG  G TYPE  T CHARGE                                    PROPELLANT WEIGHTS

            2        15.40       1.77     2.29     3.09     4.03     7.05     9.84    13.27    20.34      .00      .00
           22         2.25        .04      .07      .09      .11      .14      .16      .18      .19      .23      .00
           10          .00        .25     1.00     5.00    10.00    15.00    25.00    35.00    50.00    70.00    90.00
.....   WARNING --   2 CHARGES LARGER THAN 50. LBS
        *  80        10.50       1.20     3.40     5.70     7.30     9.20    12.10      .00      .00      .00      .00


GTYPE      NAME              EQ PARA  EQ PARB                    DIRECTIVITY VALUES                                  AVG

  2    155MM HOWITZER M109    75.74    18.51     .63   .46   .29  1.00  1.45   .39   .00   .39  1.45  1.00   .29   .46   .67
 22    81-MM MORTAR           90.27    19.57    8.29  6.39  4.48  5.75  2.20  2.88   .00  2.88  2.20  5.75  4.48  6.39  4.86
 10    SMALL DEMO               .00      .00     .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
 80    EXPERIMENTAL           83.79    13.91   17.80 13.91 10.02  6.46  2.97   .53   .00   .53  2.97  6.46 10.02 13.91 10.84

.....  2 ERROR/WARNING CONDITIONS DETECTED FOR THIS CARD TYPE
```

Figure D2a. MAP module output: gun types and parameters.

```
.....      TARGET CARDS      .....

FLAG    ID       X         Y        HT CORR

        TP1     27000.    25000.       0.
  *     TP2     32000.    25000.       0.

.....   0 ERROR/WARNING CONDITIONS DETECTED FOR THIS CARD TYPE
```

Figure D2b. MAP module output: target IDs and coordinates.

```
.....      FIRING PT. SOURCE AND DEFINITION CARDS      .....

FLAG    ID       X         Y        HT CORR   G TYPE  DAYNO  NIGHTNO  MIN  MAX  T ID  FLAG   HGT

        FP1     29000.    23000.       0.
                                          80      0.     17.      3    4   TP1     0  100.0
  *                                       22    300.     25.      5    7   TP2     1     .0
        FP2     35000.    20000.       0.
  *                                        2    150.     10.      4    5   TP2     0     .0
        FP3     32000.    28000.       0.
  *                                       10    100.      0.      5    5           1     .0

.....   0 ERROR/WARNING CONDITIONS DETECTED FOR THIS CARD TYPE

..... END OF INPUT PHASE:     2 ERROR/WARNING CONDITIONS DETECTED
```

Figure D2c. MAP module output: firing point IDs and coordinates.

```
NUMBER OF DATA BASE CARD IMAGES READ IS     21

NUMBER OF GUN TYPES READ IS      4

NUMBER OF TARGETS READ IS      2

NUMBER OF SOURCES READ IS      3


.....      DATA BASE TIME PERIOD:  30. DAY(S)

TOTAL DAY FIRINGS IS        550.00
TOTAL NIGHT FIRINGS IS       52.00

TOTAL PER DAY DAY FIRINGS IS         18.33
TOTAL PER DAY NIGHT FIRINGS IS        1.73

MINIMUM CHARGE NUMBER     3
MAXIMUM CHARGE NUMBER     7

MINIMUM CHARGE WEIGHT        .1 LBS
MAXIMUM CHARGE WEIGHT      15.0 LBS

TOTAL DAY CHARGE WEIGHT PER DAY        215.4 LBS
TOTAL NIGHT CHARGE WEIGHT PER DAY       17.7 LBS

MAXIMUM HEIGHT IS      100.00
MAXIMUM DEPTH IS          .00


MAXIMUM X IS     35000.0 IN PAIR (    35000.0 ,     20000.0 )

MAXIMUM Y IS     28000.0 IN PAIR (    32000.0 ,     28000.0 )

MINIMUM X IS     27000.0 IN PAIR (    27000.0 ,     25000.0 )

MINIMUM Y IS     20000.0 IN PAIR (    35000.0 ,     20000.0 )

 FOR GRID SIZE   250.0, GRID DIMENSIONS =    32.0 X     32.0
```

Figure D2d. MAP module output: input data summary.

```
CROSS-REFERENCE: TARGETS BY FIRING POINTS ; DAILY FIRINGS

TARGET ID
        FPT ID          FPT ID          FPT ID          FPT ID          FPT ID          FPT ID          FPT ID
   TP1      FP1       .6
   TP2      FP1     10.8      FP2      5.3

CROSS-REFERENCE: TARGETS BY GUN TYPES;  DAILY PROJECTILE CHARGE WEIGHT (LBS)

TARGET ID
        GUN ID          GUN ID          GUN ID          GUN ID          GUN ID          GUN ID          GUN ID
   TP1      80        5.9
   TP2       2       82.1

CROSS-REFERENCE: GUN TYPES BY TARGETS;  DAILY PROJECTILE CHARGE WEIGHT (LBS)

GUN ID
        TAR ID          TAR ID          TAR ID          TAR ID          TAR ID          TAR ID          TAR ID
     2      TP2     82.1
    22      ***
    10      ***
    80      TP1      5.9

CROSS-REFERENCE: GUN TYPES BY FIRING POINTS; DAILY PROPELLENT CHARGE WEIGHT (LBS)

GUN ID
        FPT ID          FPT ID          FPT ID          FPT ID          FPT ID          FPT ID          FPT ID
     2      FP2     37.6
    22      FP1      2.0
    10      FP3     50.0
    80      FP1      4.1

          .....     TIME FOR MAPPING SUBPROGRAM IS    4.000 SECONDS
```

Figure D2e. MAP module output: cross-reference table.

```
.....     BOUNDS     .....

MINIMUM BOUNDARY =   14000.       0.      MAXIMUM BOUNDARY =   50000.   39000.
BOUNDARY VALUES VERIFIED
 ..... TIME IN BOUNDS IS     .000 .....
```

Figure D3. BOUNDS module output.

```
.....     BASE     .....

                    LINE CARDS
          X-Y START                                    X-Y END
LINE     19000.    8000.                            21000.    8000.
 NEW LINE
LINE     20000.    7000.                            20000.    9000.
 NEW LINE
LINE     24000.   10000.                            40000.   10000.
LINE     40000.   10000.                            40000.   25000.
LINE     40000.   25000.                            32000.   30000.
LINE     32000.   30000.                            24000.   25000.
LINE     24000.   25000.                            24000.   10000.
 ..... TIME IN BASE IS    1.000 .....
```

Figure D4. BASE module output: coordinates of line segments for installation outline.

```
.....     FORM-A CALCULATION     .....

.....     FOR TNT EQUIVALENT, FORM-A WILL USE MAXIMUM CHARGE ZONE

.....     DATA BASE TIME PERIOD:  30. DAY(S)


          NUMBER OF UNIQUE NOISE SOURCES COUNTED IS     6

TOTAL PER DAY DAY EXPLOSIONS IS        23.33
TOTAL PER DAY NIGHT EXPLOSIONS IS       2.63

.....     TIME FOR FORM-A SUBPROGRAM IS   19.000 SECONDS
```

Figure D5. FORMA module output.

```
     .....     PUDDLE GRID     .....

*****  WARNING -- SPECIFIED BOUNDS (  14000.0,       .0 ):(  50000.0,  39000.0 ) DO NOT CORRESPOND TO INTEGRAL GRID BOUNDS.
            MODIFIED BOUNDS WILL BE USED TO PRODUCE THE GRID AND TO DEFINE ANY PLOT UTILIZING THIS GRID


START AT DATA BASE COORDINATES (  14000.0,       .0 )

STOP  AT DATA BASE COORDINATES (  50000.0,  40000.0 )

      INVERSION =   65.80   15.50   27.90

CALCULATIONS FOR NEF WILL USE BOTH D + N OF DAY AND NIGHT CALCULATIONS


 GRID SIZE =  2000.0 ; DISTANCES IN METERS
```

Figure D6a. PUDDLE GRID module output: boundaries, grid size, weather data.

	14000	16000	18000	20000	22000	24000	26000	28000	30000	32000	34000	36000	38000	40000	42000
40000	41.2	42.1	42.9	43.3	43.9	44.6	45.0	45.4	45.4	45.4	45.2	45.0	44.4	43.7	42.9
38000	42.0	43.0	43.8	44.7	45.1	45.7	46.1	46.6	46.6	46.7	46.5	46.2	45.5	44.8	44.1
36000	42.8	43.7	44.7	45.6	46.0	46.8	47.4	47.9	48.1	48.3	47.9	47.4	46.6	45.9	44.9
34000	43.4	44.5	45.5	46.4	47.3	47.8	48.8	49.5	49.8	49.9	49.6	48.9	47.9	46.8	45.8
32000	43.8	45.0	46.2	47.2	48.3	49.1	50.3	51.2	51.8	51.9	51.5	50.3	49.1	47.8	46.5
30000	43.8	45.1	46.7	47.9	49.3	51.1	52.3	53.4	54.7	57.6	54.2	51.9	50.3	48.7	47.1
28000	44.0	45.4	46.6	48.2	50.6	53.2	55.9	56.6	58.8	92.5	58.2	53.3	51.0	49.3	47.6
26000	44.1	45.6	46.8	48.5	51.1	55.5	65.4	65.5	61.3	70.3	60.4	54.2	51.7	49.6	47.9
24000	44.1	45.6	46.8	48.5	51.1	55.3	65.4	67.5	61.8	70.1	60.2	54.1	51.7	49.7	48.0
22000	43.7	45.1	46.3	47.9	50.0	52.7	55.7	57.6	56.8	56.7	56.3	54.7	51.5	49.5	47.8
20000	43.4	44.7	45.9	47.2	48.6	50.3	51.9	52.6	53.1	53.6	61.9	62.8	51.5	49.1	47.3
18000	42.9	44.1	45.3	46.4	47.3	48.4	49.6	50.2	50.9	51.4	54.1	52.9	49.6	47.9	46.5
16000	42.4	43.5	44.4	45.3	46.3	47.2	47.9	48.6	49.0	49.5	49.7	49.0	47.9	46.8	45.7
14000	41.7	42.6	43.6	44.5	45.3	46.0	46.6	47.1	47.5	47.7	47.5	47.2	46.4	45.6	44.7
12000	40.9	41.9	42.7	43.5	44.4	44.9	45.3	45.9	46.1	46.3	46.0	45.7	45.1	44.5	43.6
10000	40.1	40.9	41.8	42.5	43.1	43.8	44.2	44.6	44.8	44.8	44.6	44.4	43.8	43.2	42.3
8000	39.6	40.0	40.9	41.4	42.0	42.6	42.9	43.3	43.5	43.5	43.3	43.0	42.4	42.0	41.3
6000	39.1	39.5	39.9	40.3	41.0	41.5	41.7	42.0	42.2	42.0	41.9	41.6	41.2	40.8	40.2
4000	38.7	38.9	39.2	39.5	39.9	40.2	40.5	40.7	40.9	40.8	40.6	40.4	40.1	39.7	39.2
2000	38.3	38.5	38.7	38.9	39.1	39.2	39.4	39.6	39.7	39.6	39.5	39.3	39.1	38.9	38.7
0	38.0	38.1	38.3	38.6	38.6	38.8	38.9	39.0	39.0	38.8	38.9	38.8	38.6	38.5	38.3

	44000	46000	48000	50000
40000	42.1	41.1	40.2	39.3
38000	43.1	42.0	41.0	39.9
36000	44.0	42.9	41.7	40.6
34000	44.7	43.7	42.4	41.2
32000	45.4	44.3	42.9	41.5
30000	45.8	44.7	43.5	42.0
28000	46.3	44.9	43.8	42.2
26000	46.4	45.1	43.9	42.3
24000	46.5	45.1	43.9	42.3
22000	46.4	45.0	43.7	42.2
20000	46.0	44.7	43.4	42.0
18000	45.5	44.2	42.8	41.4
16000	44.5	43.3	42.1	40.9
14000	43.7	42.5	41.3	40.3
12000	42.6	41.6	40.7	39.6
10000	41.5	40.7	39.9	39.1
8000	40.4	39.8	39.2	38.7
6000	39.6	39.1	38.7	38.4
4000	38.9	38.7	38.4	38.1
2000	38.5	38.3	38.1	37.8
0	38.2	37.9	37.7	37.6

..... TIME FOR PUDDLING SUBPROGRAM IS 40.000 SECONDS

Figure D6b. PUDDLE GRID module output: table of levels calculated at each grid point coordinate.

```
.....      SCATTER      .....


THE SCATTER DIAGRAM WILL REPRESENT ..DAY+NIGHT.. DATA FOR:

          ...TARGETS
          ...FIRING PTS
          ...ALL GUN TYPES

BOUNDED BY (  14000.0,       .0) - (  50000.0,  39000.0)


     ...MULTIPLIER =       2.0

     ...STANDARD DEVIATION =   300.000

     ... 30. DAYS DATA IN DATA BASE


OUTPUT FILE TAPE4 CONTAINS NASAPLOT PHS4 INPUT DATA REPRESENTING:

          2 TARGETS    :    12 SCATTER PTS.
          3 FIRING PTS:     41 SCATTER PTS.

     MULTIPLIER USED =       2.0


               .....      TIME IN SCATTER IS   2.000 SECONDS
```

Figure D7. SCATTER module output: bounds, input parameters, output parameters.

```
          .....      LOCATOR      .....
             ..OPTIONS REQUESTED..

                 TARGET
              FIRING POINT
               SIZE=  .14**      ANGLE=   .00**
               STARS INDICATE DEFAULT VALUES
              ID CODE         X COORD.      Y COORD.      G CORR.      BOUNDS
..TARGET DATA..

               TP1              27000.        25000.           0.
               TP2              32000.        25000.           0.
..FIRING POINT DATA..

               FP1              29000.        23000.           0.
               FP2              35000.        20000.           0.
               FP3              32000.        28000.           0.
          .....  TIME OF   1.000 SECONDS IN LOCATOR  .....
```

Figure D8. LOCATOR module output: labels and locations of plot annotations.

```
                    .......        PLOT        .......
                  COMPAQ       12:55.14     02-13-86       PLOT  1
             FOLLOWING FILES WERE REQUESTED

                 PGRID
                 BASE
                 LOCATOR
WARNING...PUDDLE GRID BOUNDS DO NOT MATCH SPECIFIED BOUNDS...

                 PGRID VALUES USED          SPECIFIED BOUNDS
      XMIN         14000.00                    14000.00
      YMIN             .00                         .00
      XMAX         50000.00                    50000.00
      YMAX         40000.00                    39000.00
                  VALUES USED BY PLOT

        **SCALE     =50000.0

        **PERCENT X=1.00          **PERCENT Y=1.00

          MAG       = .22         **PERC SMTH= .33

        **START     = 55          **STOP      = 75

        **L START   = 55          **L STOP    = 75

        **LABEL     = 1           **INCREMENT= 5

        **L INCREMT= 5              GRID SIZE= 2000.
         STARS INDICATE DEFAULT VALUES
         FOLLOWING CARDS WERE USER TEXT INPUT
         NO USER TEXT CARDS INPUT
         THIS PLOT IS   6 INCHES BY   7 INCHES
         ONE INCH IS EQUAL TO  5773. METERS
         IT CONSISTS OF  1 PAGES IN THE X DIRECTION AND  1 SECTIONS IN THE Y DIRECTION
           ..... TIME IN PLOT IS  29.000 .....
```

Figure D9. PLOT module output: data for first plot (CONTOURS) requested.

```
                .......        PLOT        .......
              COMPAQ       12:55:43     02-13-86       PLOT  2
         FOLLOWING FILES WERE REQUESTED

             BASE
             SCATTER
              VALUES USED BY PLOT

      **SCALE     =50000.0

      **PERCENT X=1.00          **PERCENT Y=1.00

        MAG       = .22         **PERC SMTH= .33

      **START     = 55          **STOP      = 75

      **L START   = 55          **L STOP    = 75

        LABEL     =-1           **INCREMENT= 5

      **L INCREMT= 5              GRID SIZE=    0.
       STARS INDICATE DEFAULT VALUES
       FOLLOWING CARDS WERE USER TEXT INPUT
       NO USER TEXT CARDS INPUT
       THIS PLOT IS   6 INCHES BY   7 INCHES
       ONE INCH IS EQUAL TO  5773. METERS
       IT CONSISTS OF  1 PAGES IN THE X DIRECTION AND  1 SECTIONS IN THE Y DIRECTION
         ..... TIME IN PLOT IS   7.000 .....
```

Figure D10. PLOT module output: data for second plot (SCATTERGRAM) requested.

APPENDIX E:

FUNDAMENTAL DOS COMMANDS

To load the MicroBNOISE program onto a hard disk:

Make a directory that will contain the program and data files using the command "mkdir."

C> mkdir <name>

Change into the new directory using the "change directory" command

C> cd <name>

Insert the program or data disks into floppy disk drive A.

Change over to disk drive A using the command

C>a:

Copy the files from the floppy disks over to the hard disk using the "copy" command.

A>copy *.* c:

After copying all the files over to the hard disk, return to the hard disk by typing

A>c:

The program can then be activated by typing

C>bnoise

Error Messages

Attached is a listing of error messages that might appear during a MicroBNOISE run. In general, the "Runtime Errors" (error codes 1000 through 2002) are those of interest, since the program has been compiled and linked and all of the compiler errors have been eliminated.

Most errors can be traced to unexpected characters in the data files (e.g., control characters, or alpha data when numeric data is expected). In general, blank lines are not allowed in the data files; they produce runtime errors, aborting execution.

C.2 Compiler Back End Errors

The main source of back end errors is user error from either the optimizer or the code generator. There are, in fact, very few of these errors. All are concerned with limitations that cannot be detected by the front end.

Back end errors cause an immediate termination, while an error number and approximate listing line number appear on your screen. The back end errors are listed below:

Code	Message
1	Attempt to divide by zero. For example, A DIV 0.
2	Overflow during integer constant folding. For example, MAXINT + A + MAXINT.
3	Expression too complex (Too many internal labels. Try breaking up expression with intermediate value assigns.
4	Too many procedures and or functions. *Pcode only. Try breaking up compiland into modules or units.*
5	Range error (number too large to fit into target).

C.3 Runtime Error Messages

Runtime errors fall into two classes:

1. file system errors
2. nonfile system errors

Nonfile system errors include the following:

1. memory errors
2. type REAL arithmetic errors

3. type INTEGER*4 arithmetic errors
4. other errors

If you see an error message that is not listed, check your operating system manual, as the error may be an operating system error.

C.3.1 File System Errors

Code numbers 1000 through 1099 are status codes, always issued in conjunction with an OS status code.

Code	Message
1000	Write error when writing end of file
1002	Filename extension with more than 3 characters
1003	Error during creation of new file (Disk or directory full)
1004	Error during open of existing file (File not found)
1005	Filename with more than 8 or zero characters
1007	Filename length over 21 characters or contains invalid characters
1008	Write error when advancing to next record
1009	File too big (Over 65535 logical sectors)
1010	Write error when seeking to direct record device
1011	Attempt to open a random file to a non-disk device
1012	Forward space or back space on a non-disk device
1013	Disk or directory full error during forward space or back space

An additional set of error messages and numbers has been created for MS-DOS 2.0 error handling. These numbers are in the range 1023 to 1048. The numbers 1031 to 1048 correspond to the MS-DOS error return codes on page D-14 of the MS-DOS manual (1030 + error return code).

Code	Message
1023	Operation error (invalid operation)
1027	Filename error (for example, invalid syntax, name too long)
1028	Device full error (disk full, directory full)
1032	File not found
1033	Path not found
1034	Too many open files (no handles left)
1035	Access denied (trying to read from write-only)
1036	Invalid handle (file not currently open)
1038	Insufficient memory
1045	Invalid drive was specified
1200	Format missing final ")"
1201	Sign not expected in input
1202	Sign not followed by digit in input
1203	Digit expected in input
1204	Missing N or Z after B in format
1205	Unexpected character in format
1206	Zero repetition factor in format not allowed
1207	Integer expected for w field in format
1208	Positive integer required for w field in format
1209	"." expected in format
1210	Integer expected for d field in format
1211	Integer expected for e field in format
1212	Positive integer required for e field in format
1213	Positive integer required for w field in format
1214	Hollerith field in format must not appear for reading
1215	Hollerith field in format requires repetition factor
1216	X field in format requires repetition factor

1217 P field in format requires repetition factor

1218 Integer appears before + or - in format

1219 Integer expected after + or - in format

1220 P format expected after signed repetition factor in format

1221 Maximum nesting level for formats exceeded

1222 ")" has repetition factor in format

1223 Integer followed by "," illegal in format

1224 "." is illegal format control character

1225 Character constant must not appear in format for reading

1226 Character constant in format must not be repeated

1227 "/" in format must not be repeated

1228 "\" in format must not be repeated

1229 BN or BZ format control must not be repeated

1230 Attempt to reference unknown unit number

1231 Formatted I O attempted on file opened as unformatted

1232 Format fails to begin with "("

1233 I format expected for integer read

1234 F or E format expected for real read

1235 Two "." characters in formatted real read

1236 Invalid REAL number

1237 L format expected for logical read

1238 Blank logical field

1239 T or F expected in logical read

1240 A format expected for character read

1241 I format expected for integer write

1242 w field in F format not greater than d field + 1

1243 Scale factor out of range of d field in E format

1244 E or F format expected for real write

1245 L format expected for logical write

1246 A format expected for character write

1247 Attempt to do unformatted I O to a unit opened as formatted

1251 Integer overflow on input

1252 Too many bytes read from input record

1253 Too many bytes written to direct access unit record

1255 Attempt to do external I O on a unit beyond end of file record

1256 Attempt to position a unit for direct access on a non-positive record number

1257 Attempt to do direct access to a unit opened as sequential

1258 Unable to seek to file position

1260 Attempt to BACKSPACE, REWIND, or ENDFILE unit connected to unblocked device

1261 Premature end of file of unformatted sequential file

1262 Invalid blocking in unformatted sequential file

1263 Incorrect physical record structure in unformatted file

1264 Attempt to do unformatted I O to internal unit

1265 Attempt to put more than one record into internal unit

1266 Attempt to write more characters to internal unit than its length

1267 EOF called on unknown unit

1268 Dynamic file allocation limit exceeded

1269 Scratch file opened for read

1270 Console I O error

1272 File operation attempted after error encountered on previous operation

1273 Keyboard buffer overflow: too many bytes written to keyboard input record
(Must be less than 132)

1274 Reading long integer

1275	Writing long integer
1281	Repeat field not on integer
1282	Multiple repeat character
1283	Invalid numeric data in list-directed input
1284	List directed numeric items bigger than record size
1285	Invalid string in list-directed input
1286	No comma encountered in list-directed complex input
1298	End-of-file encountered
1299	Integer variable not ASSIGNed a label used in assigned GOTO

C.3.2 Other Runtime Errors

Nonfile system error codes range from 2000 to 2999. In some cases, metacommands determine if errors are checked; in other cases, error codes are always checked.

C.3.2.1 Memory Errors

The heap is the storage area where MS-FORTRAN dynamically allocates storage for file control blocks. Since the stack and the heap grow toward each other, memory errors are all related; for example, a stack overflow can cause a "Heap is Invalid" error.

General note regarding floating-point overflow: A floating-point overflow in either direct or emulated mode, generates a NAN ("Not-A-Number") which appears in the output field as asterisks (*) or the letters "NAN", depending on the choice of formats.

Code	Message
2000	Stack Overflow
2002	Heap is Invalid

C.3.2.2 Type INTEGER Arithmetic Errors

2052 INTEGER Divide By Zero
(This error appears only when $DEBUG is set.)

2054 INTEGER Math Overflow
(This error appears only when $DEBUG is set.)

2084 INTEGER Zero to Negative Power

C.3.2.3 Type REAL Arithmetic Errors

Code	Message
2100	REAL Divide By Zero
2101	REAL Math Overflow
2102	SIN or COS Argument Range
2103	EXP Argument Range
2104	SQRT of Negative Argument
2105	LN of Non-Positive Argument
2106	TRUNC ROUND Argument Range
2131	Arctan Argument Zero
2132	Arcsine or Arccosine of REAL > 1.0
2133	Negative REAL to REAL Power
2134	REAL Zero to Negative Power
2135	REAL Math Underflow
2136	REAL Indefinite (uninitialized or previous error)
2137	Missing Arithmetic Processor (You have linked your program with the runtime library intended for use with the 8087 numeric coprocessor, but there is no coprocessor on your system. Relink your program with the runtime library that emulates floating point arithmetic.)
2139	REAL Precision Loss (An arithmetic operation on the 8087 numeric coprocessor has generated a loss of numeric precision in the result of an operation.)

2140 REAL Arithmetic Processor Instruction Illegal or Not Emulated
(An attempt was made to execute an illegal arithmetic coprocessor instruction, or the floating point emulator cannot emulate a legal coprocessor instruction.)

2145 REAL Stack Overflow
(Using the alternate math package and expression too many real operands were encountered.)

C.3.2.4 Type INTEGER*4 Arithmetic Errors

Code	Message
2200	Long integer divided by zero
2201	Long integer math overflow
2234	Long integer zero to negative power

C.3.2.5 Other Errors

Code	Message
2451	Assigned GOTO label not in list (This error appears only when $DEBUG is set.)

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